red lion

Tel +1 (717) 767-6511
Fax +1 (717) 764-0839
www.redlion.net

MODEL CSSG1 – MODULAR CONTROLLER SERIES STRAIN GAGE MODULE

- *STRAIN GAGE MODULE FOR THE MODULAR CONTROLLER SERIES*
- *HOT-SWAPPABLE REPLACEMENT REDUCES DOWNTIME*
- *AUTO ADDRESSING MINIMIZES CONFIGURATION TIME*
- *PID CONTROL WITH REDUCED OVERSHOOT*
- *LOAD CELL, PRESSURE AND TORQUE BRIDGE INPUTS*
- *SOFTWARE SELECTABLE LOW LEVEL INPUTS (20 mV, 33 mV or 200 mV FULL SCALE)*
- *SOFTWARE SELECTABLE 5 VDC or 10 VDC BRIDGE EXCITATION*
- *DIGITAL TARE (re-zero), BATCH TOTALIZER, AND PEAK/VALLEY (max/min) RECORDING*
- *ON DEMAND AUTO-TUNING OF PID SETTINGS*
- *DC ANALOG OUTPUT*
- *WINDOWS® CONFIGURATION SOFTWARE*

C UL US LISTED
IND. CONT. EQ.
34AD

CE

GENERAL DESCRIPTION

The Model CSSG is a full featured single loop PID controller designed for use with the Modular Controller Series. The module accepts low level signals from a variety of bridge-type transducers, such as load cells, pressure transducers, torque transducers, etc. An optional second signal input is available, providing math capabilities between the two input channels (average, differential, etc.). Each input channel provides a software selectable 5 V or 10 V stable bridge excitation voltage, capable of driving up to four 350 Ω bridges (combined total per module). The inputs are software selectable for ±20 mV, ±33 mV, or ±200 mV full scale. With solid state or relay outputs, plus an analog output, the CSSG module can perform virtually any combination of time-proportioning or linear control. The discrete outputs may also be assigned to one of seven internal soft alarms; and the linear output can be assigned to transmit virtually any internal variable. In addition, digital tare (re-zero), batch totalizer, and peak/valley (max/min) are provided.

The modules connect and communicate via a backplane connection to the CSMSTR Master module. The Master, equipped with serial ports as well as an Ethernet port, allows the system to share data with PCs, PLCs, and SCADA systems. The Master supports up to 16 CS Series modules (when using CSSG modules, refer to "Power" specifications).

The CSSG modules are available with relays, or open drain MOSFET outputs. For applications requiring large loads to be controlled, several DIN rail mount relays are available.

The modules can operate in On/Off, P, PI, or PID control mode, and use an on-demand Auto-Tune that establishes the tuning constants. The PID constants may be fine-tuned through the serial or Ethernet interface. The modules employ a unique overshoot suppression feature, which allows the quickest response without excessive overshoot. The modules can also be operated in manual mode, providing the operator with direct control of the output.

Internal power management circuits allow the modules to be replaced while power is applied, which reduces downtime in the event of a relay failure. All configuration information is stored locally within each module, as well as in the Master, so replacement modules do not need to be configured.

The Modular Controller Series' high density packaging and DIN rail mounting saves time and panel space. The backplane connection provides power and communication to the module and snaps easily onto standard top hat (T) profile DIN rail.
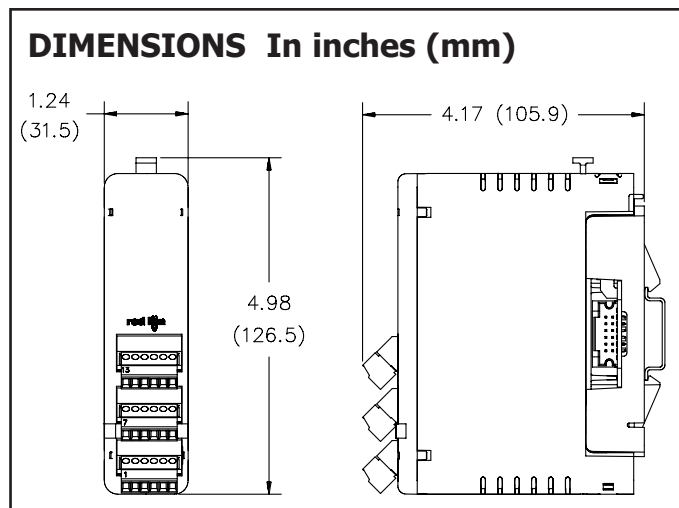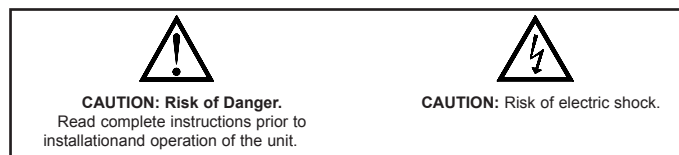
CONFIGURATION

The Modular Controller Series is configured with Windows® compatible Crimson™ software. The software is an easy to use, graphical interface which provides a means of configuration and commissioning of new systems, as well as routine module re-calibration.

SAFETY SUMMARY

All safety related regulations, local codes and instructions that appear in the manual or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Do not use the controller to directly command motors, valves, or other actuators not equipped with safeguards. To do so can be potentially harmful to persons or equipment in the event of a fault to the controller.

CAUTION: Risk of Danger. Read complete instructions prior to installation and operation of the unit.

CAUTION: Risk of electric shock.

DIMENSIONS In inches (mm)

1.24 (31.5)

4.17 (105.9)

4.98 (126.5)

SPECIFICATIONS

1. **POWER**: Derived from system backplane. 250 mA max. load on power input of MASTER. Module may be hot-swapped (replaced while powered up).
   Modules per Master: A single Master can support up to 11 CSSG1 modules combined with any 5 other module types. For applications that require more than 11 CSSG1 modules, please contact technical support.

2. **LEDs***:
   STS - Status LED shows module condition.
   OP1, OP2, OP3 - Indicate status of outputs 1, 2, and 3
   ALM - Alarm LED is lit during an internal alarm condition.
   * Default configuration.

3. **MEMORY**: Non-volatile memory retains all programmable parameters. The MASTER also stores the parameters in order to reprogram any modules that are replaced.

4. **INPUTS**:

SOFTWARE SELECTABLE INPUT RANGE	ACCURACY * 18 TO 28°C 10 TO 75% RH	ACCURACY * 0 TO 50°C 0 TO 85% RH
±20.000 mVDC	0.02% of reading +3 µV	0.07% of reading +4 µV
±33.000 mVDC	0.02% of reading +5 µV	0.07% of reading +7 µV
±200.00 mVDC	0.02% of reading +30 µV	0.07% of reading +40 µV

   * After 20 minute warm-up. Accuracy over the 0 to 50°C range includes the temperature coefficient.
   Connection Type:
      4-wire bridge (differential)
      2-wire (single-ended)
   Sample Time: 67 msec (15 readings per second)
   Common Mode Range (with respect to input common): 0 to +5 VDC
   Common Mode Rejection: > 100 dB, DC to 120 Hz
   Temperature Coefficient (ratio metric): 20 ppm/°C max.
   Step Response Time: 200 msec max. to within 99% of final process value
   Input Impedance: 100 MΩ
   Max Continuous Overload: 30 V
   PV Range: -30,000 to 30,000
   Effective Resolution: 16-bit

5. **BRIDGE EXCITATIONS**:
   Software selectable:
      5 VDC, ±2%, 65 mA max.
      10 VDC, ±2%, 125 mA max. combined (excitation 1 plus excitation 2).
   Temperature coefficient (ratio metric): 20 ppm/°C max.
   Max. four 350Ω bridges per module.

6. **ISOLATION LEVEL**: 500 Vrms @ 50/60 Hz for 1 minute between the following:
   OP1 *
   OP2 *
   OP3
   Linear Output
   Signal Inputs (the 2 input channels are not isolated from each other)
   CS Master Power Supply Input
   * Outputs OP1 and OP2 of SSR model are not isolated from each other

7. **COMMUNICATIONS**: Provided by the CS Master.

8. **DISCRETE OUTPUTS**:
   Outputs 1 and 2 are available as Solid State NFET, or Form A relay. Output 3 is a Form C relay.
   Solid State Output:
      Type: Switched DC, N Channel open drain MOSFET
      Current Rating: 1 A max
      VDS ON: 0.3 V @ 1 A
      VDS MAX: 30 VDC
      Offstate Leakage Current: 0.5 mA max
   Form A Relay Output:
      Type: N.O.
      Current Rating: 3 Amps @ 125 VAC
      1/10 HP @ 125 VAC
      Life Expectancy: 200,000 cycles at maximum load rating. (Decreasing load, increasing cycle time, and use of surge suppression such as RC snubbers increases life expectancy.)
   Form C Relay Output:
      Type: SPDT
      Current Rating: 5 Amps @ 125 VAC or 28 VDC (resistive load)
      1/8 HP @ 125 VAC
      Life Expectancy: 100,000 cycles at maximum load rating. (Decreasing load, increasing cycle time, and use of surge suppression such as RC snubbers increases life expectancy.)

9. **CONTROL MODES**:
   Control: On/Off, P, PI, or PID
   Output: Time proportioning or linear
   Cycle Time: Programmable from 0.0 to 60.0 sec
   Auto-Tune: When selected, sets proportional band, integral time, derivative time values, and output dampening time
   Input Fault Response: Upscale

10. **ALARMS**:
    Modes:
       Manual

Absolute High Acting	Absolute Low Acting
Deviation High Acting	Deviation Low Acting
Inside Band Acting	Outside Band Acting

    Reset Action: Programmable; automatic or latched
    Standby Mode: Programmable; enable or disable
    Hysteresis: Programmable
    Input Fault Response: Upscale

11. **ANALOG DC OUTPUT**:
    Jumper Selectable/programmable for 0-10 VDC, 0-20 mA, or 4-20 mA
    Resolution:
       Voltage: 500 µV
       Current: 1 µA
    Accuracy:
       0.1% of full scale (18 to 28°C)
       0.2% of full scale (0 to 50°C)
    Update Time: 0.0 to 60.0 sec
    Compliance (for current output only): 500 Ω max.
    Minimum load (voltage output only): 10 KΩ min.
    Output is independently jumper selectable for either 10 V or 20 mA. The output range may be field calibrated to yield approximate 10% overrange and a small underrange (negative) signal.

12. **ENVIRONMENTAL CONDITIONS**:
    Operating Temperature Range: 0 to +50°C
    Storage Temperature Range: -40 to +85°C
    Operating and Storage Humidity: 85% max relative humidity, non-condensing, from 0 to +50°C
    Vibration According to IEC 68-2-6: 10 to 150 Hz, 0.075 mm amplitude in X, Y, Z direction 1 g.
    Shock According to IEC 68-2-27: Operational 25 g (10g relay), 11 msec in 3 directions.
    Altitude: Up to 2000 meters

13. **CERTIFICATIONS AND COMPLIANCES**:
    SAFETY
       UL Listed, File # E302106, UL508, CSA C22.2 No. 14-M05
          LISTED by Und. Lab. Inc. to U.S. and Canadian safety standards
       IEC 61010-1, EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1.
    ELECTROMAGNETIC COMPATIBILITY
       Emissions and Immunity to EN 61326: Electrical Equipment for Measurement, Control and Laboratory use.

    Immunity to Industrial Locations:

Electrostatic discharge	EN 61000-4-2	Criterion A 4 kV contact discharge 8 kV air discharge
Electromagnetic RF fields	EN 61000-4-3	Criterion B 10 V/m
Fast transients (burst)	EN 61000-4-4	Criterion A 2 kV power 1 kV signal
Surge	EN 61000-4-5	Criterion B 1 kV L-L, 2 kV L&N-E power
RF conducted interference	EN 61000-4-6	Criterion A 3 V/rms

    Emissions:

Emissions	EN 55011	Class A

    Notes:
       1. Criterion A: Normal operation within specified limits.
       2. Criterion B: Temporary loss of performance from which the unit self-recovers.
       3. Power supplied from backplane via Master Module.

14. **CONSTRUCTION**: Case body is burgundy high impact plastic. Installation Category I, Pollution Degree 2.

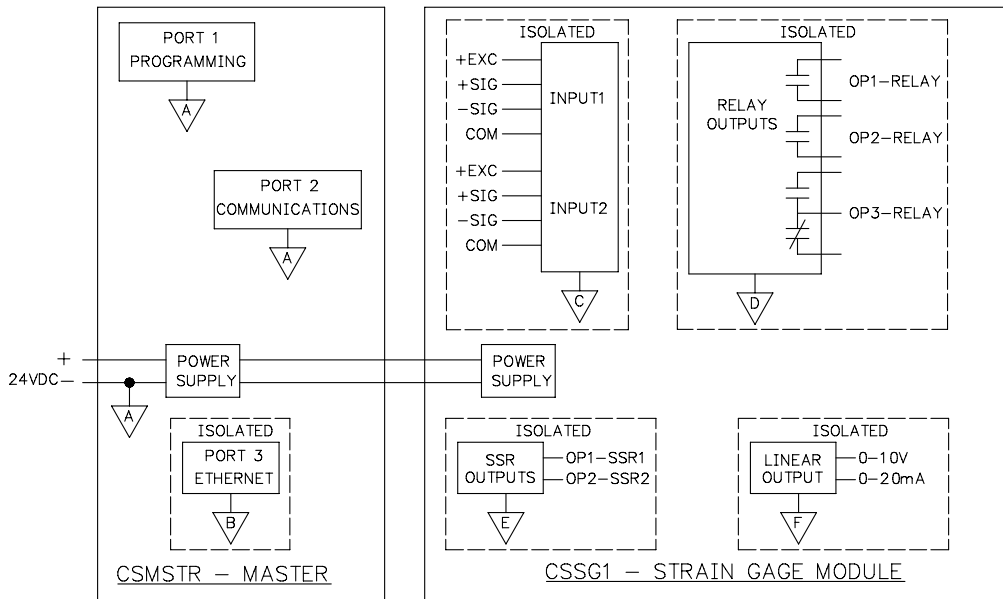15. **CONNECTIONS**: Removable wire clamp screw terminal blocks.
    Wire Gage: 28-16 AWG terminal gage wire
    Torque: 1.96-2.23 inch/lbs (0.22-0.25 N-m)

16. **MOUNTING**: Snaps on to standard DIN style top hat (T) profile mounting rails according to EN50022 -35 x 7.5 and -35 x 15.

17. **WEIGHT**: 7 oz (198.4 g)

BLOCK DIAGRAM

EMC INSTALLATION GUIDELINES

Although Red Lion Controls Products are designed with a high degree of immunity to Electromagnetic Interference (EMI), proper installation and wiring methods must be followed to ensure compatibility in each application. The type of the electrical noise, source or coupling method into a unit may be different for various installations. Cable length, routing, and shield termination are very important and can mean the difference between a successful or troublesome installation. Listed are some EMI guidelines for a successful installation in an industrial environment.

1. A unit should be mounted in a metal enclosure, which is properly connected to protective earth.
   a. The mounting clip that connects to the DIN rail should have the DIN rail connected to protective earth.
2. Use shielded (screened) cables for all Signal and Control inputs. The shield (screen) pigtail connection should be made as short as possible. The connection point for the shield depends somewhat upon the application. Listed below are the recommended methods of connecting the shield, in order of their effectiveness.
   a. Connect the shield to earth ground (protective earth) at one end where the unit is mounted.
   b. Connect the shield to earth ground at both ends of the cable, usually when the noise source frequency is over 1 MHz.
   c. Connect the shield to common of the module and leave the other end of the shield unconnected and insulated from earth ground.
3. Never run Signal or Control cables in the same conduit or raceway with AC power lines, conductors feeding motors, solenoids, SCR controls, and heaters, etc. The cables should be run through metal conduit that is properly grounded. This is especially useful in applications where cable runs are long and portable two-way radios are used in close proximity or if the installation is near a commercial radio transmitter. Also, Signal or Control cables within an enclosure should be routed as far away as possible from contactors, control relays, transformers, and other noisy components.
4. Long cable runs are more susceptible to EMI pickup than short cable runs. Therefore, keep cable runs as short as possible.

5. In extremely high EMI environments, the use of external EMI suppression devices such as Ferrite Suppression Cores for signal and control cables is effective. The following EMI suppression devices (or equivalent) are recommended:
   Fair-Rite part number 0443167251 (RLC part number FCOR0000)
   TDK part number ZCAT3035-1330A
   Steward part number 28B2029-0A0
6. To protect relay contacts that control inductive loads and to minimize radiated and conducted noise (EMI), some type of contact protection network is normally installed across the load, the contacts or both. The most effective location is across the load.
   a. Using a snubber, which is a resistor-capacitor (RC) network or metal oxide varistor (MOV) across an AC inductive load is very effective at reducing EMI and increasing relay contact life.
   b. If a DC inductive load (such as a DC relay coil) is controlled by a transistor switch, care must be taken not to exceed the breakdown voltage of the transistor when the load is switched. One of the most effective ways is to place a diode across the inductive load. Most RLC products with solid state outputs have internal zener diode protection. However external diode protection at the load is always a good design practice to limit EMI. Although the use of a snubber or varistor could be used.
      RLC part numbers: Snubber SNUB0000
                        Varistor ILS11500 or ILS23000
   Note: Reference manufacturer's instructions when installing any EMI suppression device.
7. Also care should be taken when connecting input and output devices to the instrument. When a separate input and output common is provided, they should not be mixed. Therefore a sensor common should NOT be connected to an output common. This would cause EMI on the sensitive input common, which could effect the instruments, operation.

Visit RLC's web site at www.redlion.net for more information on EMI guidelines, Safety and CE issues as they relate to Red Lion Controls products.
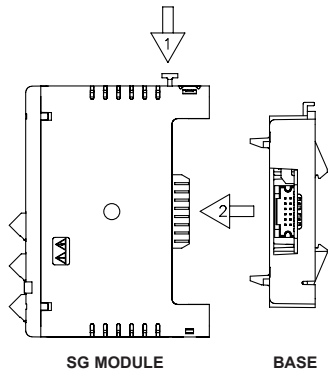
HARDWARE

ANALOG OUTPUT OPTION

Select either Voltage or Current output by placing the output jumpers in the appropriate location. The output jumpers are located on the side of the CSSG1 module.
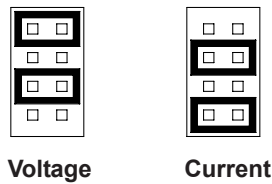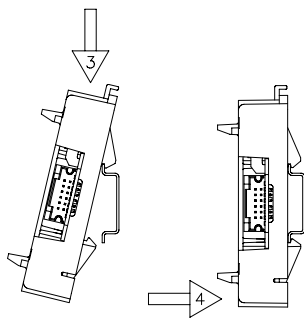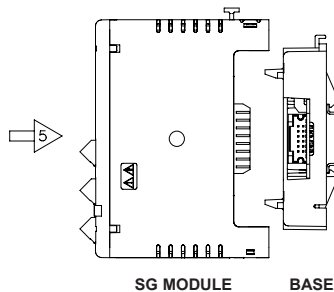
Voltage   **Current**

INSTALLATION

SEPARATE BASE FROM MODULE

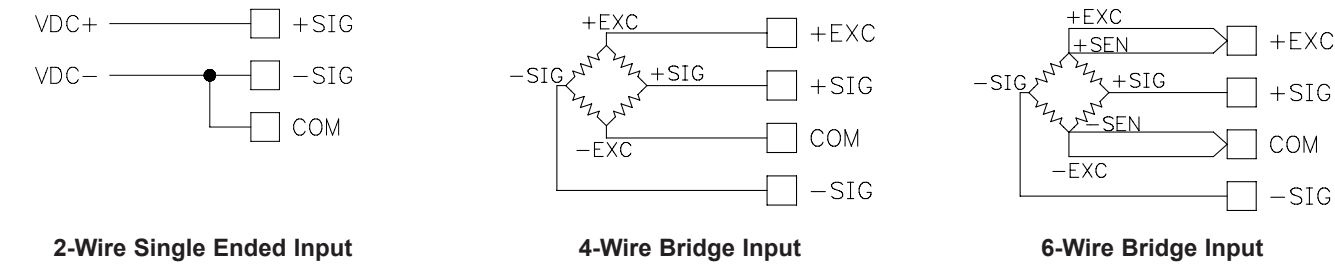## ATTACH THE MODULE BASE TO THE DIN RAIL

ATTACH MODULE TO BASE

SG MODULE   BASE

SG MODULE   BASE

WIRING

WIRING CONNECTIONS

All conductors should meet voltage and current ratings for each terminal. Also, cabling should conform to appropriate standards of good installation, local codes and regulations. When wiring the module, use the numbers on the label to identify the position number with the proper function. Strip the wire, leaving approximately 1/4" (6 mm) of bare wire exposed. Insert the wire into the terminal, and tighten.

Terminals 13 to 18

Terminals 7 to 12

Terminals 1 to 6

OP3 COM. | OP3 N.O. | OP3 N.C. | N/C | ANALOG+ | ANALOG–
13 14 15 16 17 18

(OPT.)
2
OP1 COM. | OP1 + | OP2 COM. | OP2 + | +SIG. | +EXC.
7 8 9 10 11 12

1   (OPT.) 2
COM. | –SIG. | +SIG. | +EXC. | COM. | –SIG.
1 2 3 4 5 6

4

INPUT CONNECTIONS

2-Wire Single Ended Input

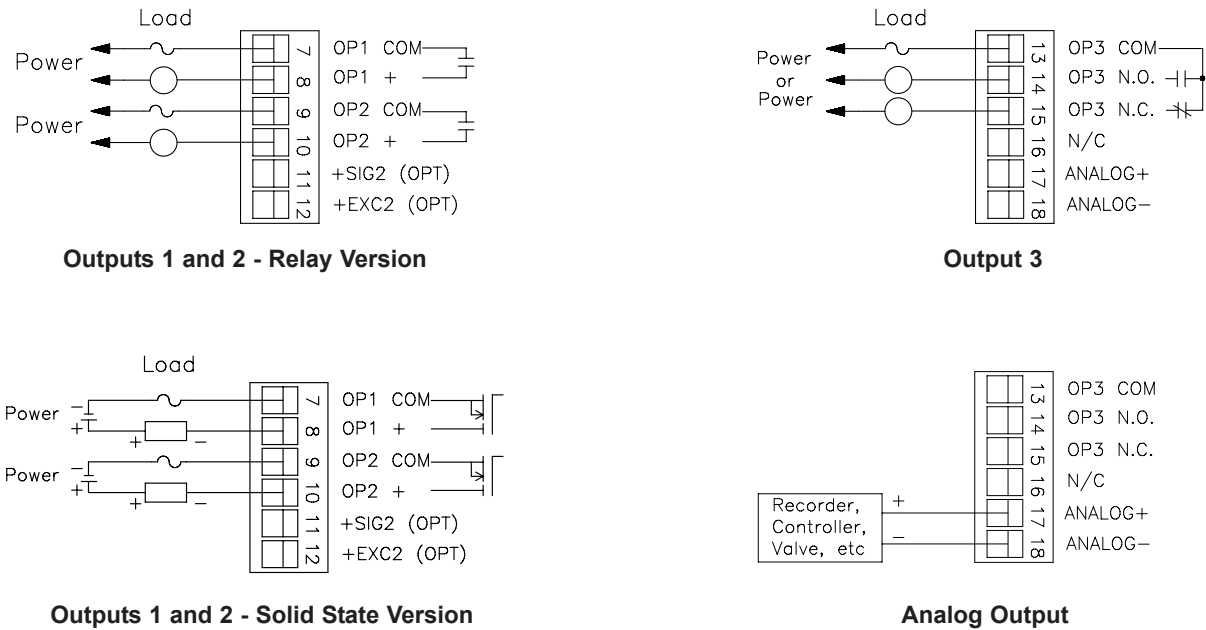

4-Wire Bridge Input

6-Wire Bridge Input
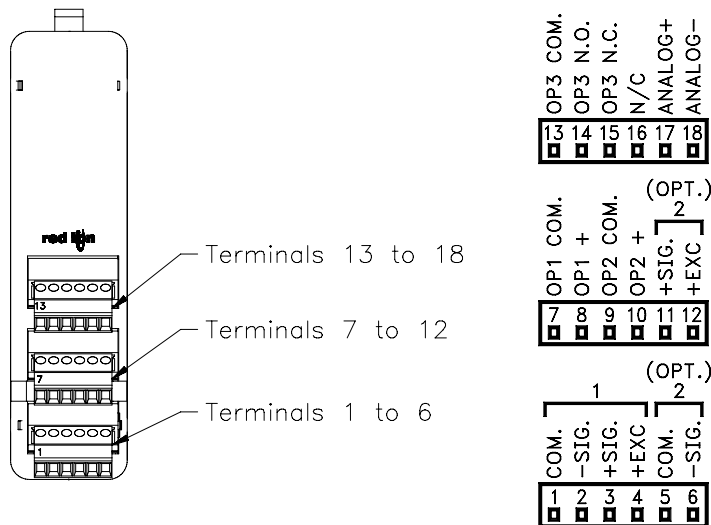
BRIDGE COMPLETION RESISTORS

For single strain gage applications, bridge completion resistors must be employed externally to the module. Only use metal film resistors with a low temperature coefficient of resistance.

Load cells and pressure transducers are normally implemented as full resistance bridges and do not require bridge completion resistors.

OUTPUT CONNECTIONS

Outputs 1 and 2 - Relay Version

Output 3

Outputs 1 and 2 - Solid State Version

Analog Output

LEDS

STS – STATUS LED

The Status LED is a dual color LED that provides information regarding the state of the module. This includes indication of the various stages of the start-up routine (power-up), as well as any errors that may occur.

Startup Routine

Rapidly Flashing Red	Module is currently running the boot loader and/or being flash upgraded by Crimson. This occurs for four seconds during a power up.
Steady Red	Module switching to configuration.
Green	Module performing normally.

Error States

Solid Red	Module not controlling, and not communicating.
Green/Pulsing Red	Module is controlling properly, but has lost communication with the Master.

OP1, OP2, OP3, – OUTPUT STATUS LED

The OP1, OP2, andOP3 LEDs are factory configured to indicate the status of the outputs. The LEDs turn on when the output is active.

These LEDs may be remapped to various other module properties.

ALM – ALARM LED

The Alarm LED is factory configured to indicate the presence of an alarm. Whenever one of the seven alarms is active, the LED turns on.

This LED may be remapped to various other module properties.

FIRMWARE UPGRADE

The module's firmware is stored in flash memory to prevent software/hardware conflicts, and so that software features may be added in the future.

During a download, Crimson compares its own library of firmware files with those stored in the Master module. If they do not match, Crimson will download the necessary files. The Master then checks to make sure that the I/O modules contain the same firmware. If they contain a different revision, the Master will automatically copy those files into the module's flash memory. During this process, the module LEDs will flash rapidly, starting with the top row, and progressing through the remaining rows until the process is complete.

CONFIGURATION

Programming is done via Crimson, a Windows® compatible configuration interface. Please see the Crimson manual for more information.

ORDERING INFORMATION

TYPE	MODEL NO.	DESCRIPTION	PART NUMBER
Master Module	CSMSTR	Modular Controller Master, Multi Comms ports and Ethernet	CSMSTRV2
		Modular Controller Master with multiple protocol converter, data logger, web server with Virtual HMI up to QVGA (320 x 240) size and expansion slot.	CSMSTRSX
		Modular Controller Master with multiple protocol converter, data logger, web server with Virtual HMI up to VGA (640 x 480) size and expansion slot with increased SDRAM	CSMSTRGT
Strain Gage Control Modules	CSSG1[1]	Single Loop, One SG Input, Relay Outputs, Analog Out	CSSG10RA
		Single Loop, One SG Input, Solid State Outputs, Analog Out	CSSG10SA
		Single Loop, Two SG Inputs, Relay Outputs, Analog Out	CSSG11RA
		Single Loop, Two SG Inputs, Solid State Outputs, Analog Out	CSSG11SA
Communications Cables (10 feet)	CBL	Programming Cable for CS, G3, & Paradigm Series	CBLPROG0
		Communications Cables[1]	CBLxxxxx
Software		Crimson Programming Software[2]	SFCRM
		Crimson Programming Software, Manual, and Download Cable	SFCRK
Accessories		Rail Stops (Qty 2)	RSRSTP00
		Replacement Base	CSBASE00
		Replacement Termination Plug	CSTERM00

[1] Visit www.redlion.net for a complete list of PID modules, data acquisition modules, communications drivers and cables.

[2] Free at www.redlion.net

This page intentionally left blank

LIMITED WARRANTY

The Company warrants the products it manufactures against defects in materials and workmanship for a period limited to two years from the date of shipment, provided the products have been stored, handled, installed, and used under proper conditions. The Company's liability under this limited warranty shall extend only to the repair or replacement of a defective product, at The Company's option. The Company disclaims all liability for any affirmation, promise or representation with respect to the products.

The customer agrees to hold Red Lion Controls harmless from, defend, and indemnify RLC against damages, claims, and expenses arising out of subsequent sales of RLC products or products containing components manufactured by RLC and based upon personal injuries, deaths, property damage, lost profits, and other matters which Buyer, its employees, or sub-contractors are or may be to any extent liable, including without limitation penalties imposed by the Consumer Product Safety Act (P.L. 92-573) and liability imposed upon any person pursuant to the Magnuson-Moss Warranty Act (P.L. 93-637), as now in effect or as amended hereafter.

No warranties expressed or implied are created with respect to The Company's products except those expressly contained herein. The Customer acknowledges the disclaimers and limitations contained herein and relies on no other warranties or affirmations.

red lion

Tel +1 (717) 767-6511
Fax +1 (717) 764-0839
www.redlion.net

MODEL CSOUT - MODULAR CONTROLLER SERIES
4-CHANNEL ANALOG OUTPUT MODULE

- HIGH DENSITY ANALOG OUTPUT MODULE FOR THE MODULAR CONTROLLER SERIES
- AVAILABLE OUTPUTS INCLUDE 0 to 5 VDC, 0 to 10 VDC, ±10 VDC, AND 0/4-20 mA DC
- OUTPUTS ARE ISOLATED FROM EACH OTHER AND FROM THE BACKPLANE
- OUTPUTS ARE SOFTWARE CONFIGURED AND FULLY SCALABLE
- AUTO ADDRESSING MINIMIZES CONFIGURATION TIME
- CAN BE USED IN CONJUNCTION WITH ANY CS SERIES MODULES

C **UL** US LISTED
IND. CONT. EQ.
34AD

$C\mathepsilon$

GENERAL DESCRIPTION

The model CSOUT is an analog output module designed for use with the Modular Controller Series. The module provides four isolated outputs that are independently programmable for output ranges of 0-5V, 0-10V, +/-10V, 0-20mA, or 4-20mA. Internal scaling is provided to accommodate virtually any application.

The modules connect and communicate via a backplane connection to the CSMSTR Modular Controller Series Master. The CSMSTR, equipped with serial ports as well as an Ethernet port, allows the system to share data with PCs, PLCs, and SCADA systems. The Master supports up to 16 CS Series modules (refer to the "Power" specifications).

Internal power management circuits allow the modules to be replaced while power is applied, which reduces downtime. All configuration information is stored locally within each module, as well as in the Master, so replacement modules do not need to be configured.

The Modular Controller Series' high density packaging and DIN rail mounting saves time and panel space. The backplane connection provides power and communication to the module and snaps easily onto standard top hat (T) profile DIN rail.

CONFIGURATION

The Modular Controller Series is configured with Windows® compatible Crimson™ software. The software is an easy to use, graphical interface that provides a means of communication configuration, as well as commissioning and calibration of new systems.

SAFETY SUMMARY

All safety related regulations, local codes and instructions that appear in the manual or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Do not use the module to directly command motors, valves, or other actuators not equipped with safeguards. To do so can be potentially harmful to persons or equipment in the event of a fault to the module.
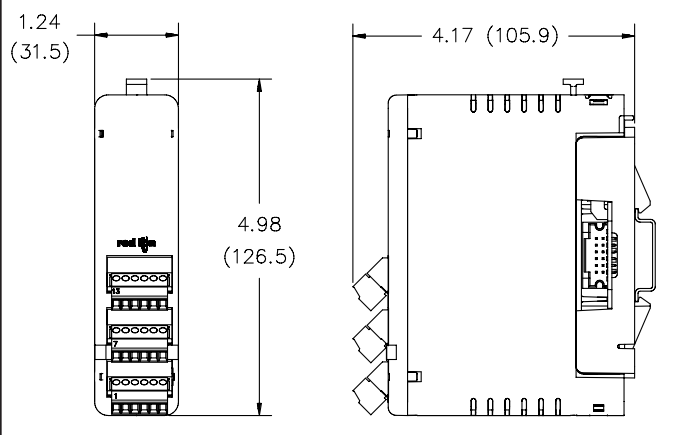
⚠	⚡
CAUTION: Risk of Danger. Read complete instructions prior to installation and operation of the unit.	**CAUTION:** Risk of electric shock.

DIMENSIONS In inches (mm)

1.24 (31.5)

4.17 (105.9)

4.98 (126.5)

SPECIFICATIONS

1. **POWER**: Derived from system backplane. (CSOUT draws 180 mA max. load on power input of MASTER). Modules may be hot-swapped (replaced while powered up).
2. **LEDs**:
   STS - Status LED shows module condition.
   ALM - Alarm LED is lit when an internal alarm condition exists.
3. **MEMORY**: Non-volatile memory retains all programmable parameters. MASTER also stores the parameters in order to reprogram modules that are replaced.
4. **COMMUNICATIONS**: Provided by the CS Master
5. **OUTPUTS**:
   Channels: 4 independent outputs
   Response Time: 25 msec max. to within 99% of final value
   Output Range: software selectable

OUTPUT RANGE	ACCURACY * 18 to 28 °C 10 to 75% RH	ACCURACY * 0 to 50 °C 0 to 85% RH	COMPLIANCE	RESOLUTION
0 to 5 VDC	0.2% of span	0.4% of span	10K Ω min.	1/30,000
0 to 10 VDC	0.1% of span	0.2% of span	10K Ω min.	1/60,000
-10 to +10 VDC	0.1% of span	0.2% of span	10K Ω min.	1/60,000
0 to 20 mA	0.1% of span	0.2% of span	500 Ω max.	1/60,000
4 to 20 mA	0.1% of span	0.2% of span	500 Ω max.	1/48,000

* The accuracy is specified after 20 minutes warmup; in a non-condensing environment; and includes linearity errors.

6. **ISOLATION LEVEL**: The outputs are isolated from each other, and are isolated from the power supply. 500 V @ 50/60 Hz for 1 minute between any of the outputs and the CS Master power supply input.
7. **ENVIRONMENTAL CONDITIONS**:
   Operating Temperature Range: 0 to +50°C
   Storage Temperature Range: -40 to +85°C
   Operating and Storage Humidity: 85% max relative humidity, non-condensing, from 0 to +50°C
   Vibration According to IEC 68-2-6: 10 to 150 Hz, 0.075 mm amplitude in X, Y, Z direction 1 g.
   Shock According to IEC 68-2-27: Operational 25 g, 11 msec in 3 directions.
   Altitude: Up to 2000 meters

8. **CERTIFICATIONS AND COMPLIANCES**:
   SAFETY
   UL Listed, File # E302106, UL508, CSA C22.2 No. 14-M05 LISTED by Und. Lab. Inc. to U.S. and Canadian safety standards
   IEC 61010-1, EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1.
   ELECTROMAGNETIC COMPATIBILITY
   Emissions and Immunity to EN 61326: Electrical Equipment for Measurement, Control and Laboratory use.
   Immunity:

Electrostatic discharge	EN 61000-4-2	Criterion B 4 kV contact discharge 8 kV air discharge
Electromagnetic RF fields	EN 61000-4-3	Criterion A 10 V/m
Fast transients (burst)	EN 61000-4-4	Criterion A 2 kV power 1 kV signal
Surge	EN 61000-4-5	Criterion A 1 kV L-L, 2 kV L&N-E power
RF conducted interference	EN 61000-4-6	Criterion A 3 V/rms

   Emissions:

Emissions	EN 55011	Class A

   Notes:
   1. *Criterion A: Normal operation within specified limits.*
   2. *Criterion B: Temporary loss of performance from which the unit self-recovers.*
   3. *Power supplied from back plane via Master Module.*

9. **CONSTRUCTION**: Case body is burgundy high impact plastic. Installation Category I, Pollution Degree 2.
10. **CONNECTIONS**: Removable wire clamp screw terminal blocks.
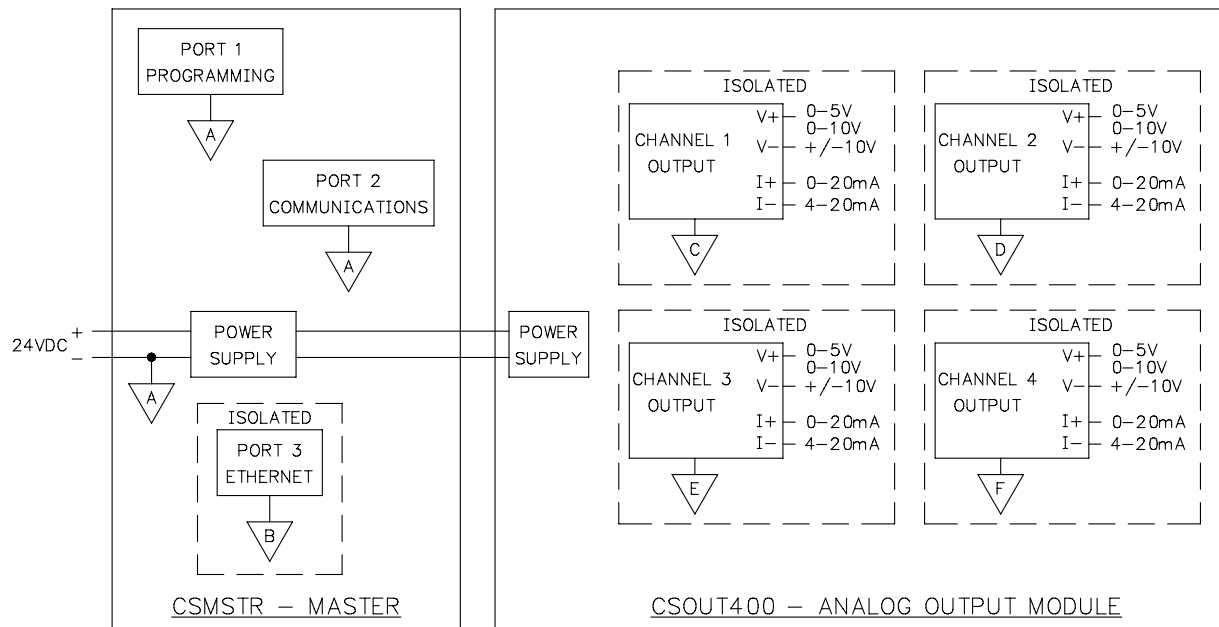   Wire Gage: 28-16 AWG terminal gage wire
   Torque: 1.96-2.23 inch/lbs (0.22-0.25 N-m)
11. **MOUNTING**: Snaps on to standard DIN style top hat (T) profile mounting rails according to EN50022 -35 x 7.5 and -35 x 15.
12. **WEIGHT**: 7 oz (198.4 g)

BLOCK DIAGRAM

EMC INSTALLATION GUIDELINES

Although Red Lion Controls Products are designed with a high degree of immunity to Electromagnetic Interference (EMI), proper installation and wiring methods must be followed to ensure compatibility in each application. The type of electrical noise, source or coupling method into a unit may be different for various installations. Cable length, routing, and shield termination are very important and can mean the difference between a successful or troublesome installation. Listed are some EMI guidelines for a successful installation in an industrial environment.

1. A unit should be mounted in a metal enclosure, which is properly connected to protective earth.
   a. The mounting clip that connects to the DIN rail should have the DIN rail connected to protective earth.
2. Use shielded (screened) cables for all Signal and Control inputs. The shield (screen) pigtail connection should be made as short as possible. The connection point for the shield depends somewhat upon the application. Listed below are the recommended methods of connecting the shield, in order of their effectiveness.
   a. Connect the shield to earth ground (protective earth) at one end where the unit is mounted.
   b. Connect the shield to earth ground at both ends of the cable, usually when the noise source frequency is over 1 MHz.
   c. Connect the shield to common of the module and leave the other end of the shield unconnected and insulated from earth ground.
3. Never run Signal or Control cables in the same conduit or raceway with AC power lines, conductors, feeding motors, solenoids, SCR controls, and heaters, etc. The cables should be run through metal conduit that is properly grounded. This is especially useful in applications where cable runs are long and portable two-way radios are used in close proximity or if the installation is near a commercial radio transmitter. Also, Signal or Control cables within an enclosure should be routed as far away as possible from contactors, control relays, transformers, and other noisy components.
4. Long cable runs are more susceptible to EMI pickup than short cable runs. Therefore, keep cable runs as short as possible.

5. In extremely high EMI environments, the use of external EMI suppression devices such as Ferrite Suppression Cores for signal and control cables is effective. The following EMI suppression devices (or equivalent) are recommended:
   Fair-Rite part number 0443167251 (RLC part number FCOR0000)
   TDK part number ZCAT3035-1330A
   Steward part number 28B2029-0A0
6. To protect relay contacts that control inductive loads and to minimize radiated and conducted noise (EMI), some type of contact protection network is normally installed across the load, the contacts or both. The most effective location is across the load.
   a. Using a snubber, which is a resistor-capacitor (RC) network or metal oxide varistor (MOV) across an AC inductive load is very effective at reducing EMI and increasing relay contact life.
   b. If a DC inductive load (such as a DC relay coil) is controlled by a transistor switch, care must be taken not to exceed the breakdown voltage of the transistor when the load is switched. One of the most effective ways is to place a diode across the inductive load. Most RLC products with solid state outputs have internal zener diode protection. However external diode protection at the load is always a good design practice to limit EMI. Although the use of a snubber or varistor could be used.
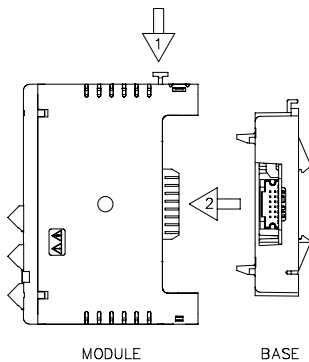   RLC part numbers: Snubber SNUB0000
      Varistor ILS11500 or ILS23000
   Note: Reference manufacturer's instructions when installing any EMI suppression device.
7. Also, care should be taken when connecting input and output devices to the instrument. When a separate input and output common is provided, they should not be mixed. Therefore a sensor common should NOT be connected to an output common. This would cause EMI on the sensitive input common, which could effect the instrument's operation.
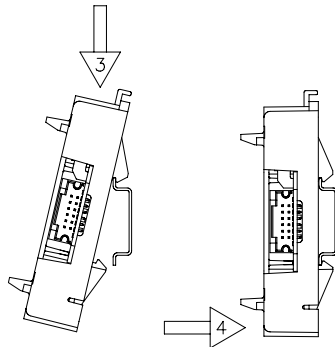
Visit RLC's web site at www.redlion.net for more information on EMI guidelines, Safety and CE issues as they relate to Red Lion Controls products.
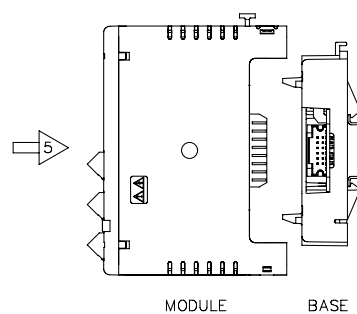
HARDWARE INSTALLATION

SEPARATE BASE FROM MODULE
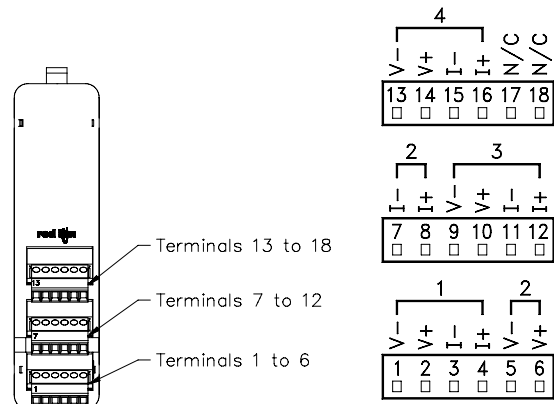
ATTACH THE MODULE BASE TO THE DIN RAIL

ATTACH MODULE TO BASE

WIRING

WIRING CONNECTIONS

All conductors should meet voltage and current ratings for each terminal. Also, cabling should conform to appropriate standards of good installation, local codes and regulations. When wiring the module, use the numbers on the label to identify the position number with the proper function. Strip the wire, leaving approximately 1/4" (6 mm) of bare wire exposed. Insert the wire into the terminal, and tighten.

LEDS

STS – STATUS LED

The Status LED is a dual color LED that provides information regarding the state of the module. This includes indication of the various stages of the start-up routine (power-up), as well as any errors that may occur.

Startup Routine

Rapidly Flashing Red	Module is currently running the boot loader and/or being flash upgraded by Crimson. This occurs for four seconds during a power up.
Steady Red	Module switching to configuration.
Green	Module performing normally.

Error States

Solid Red	Module not controlling, and not communicating.
Green/Pulsing Red	Module is controlling properly, but has lost communication with the Master.

ALM – ALARM LED

The Alarm LED indicates the presence of a fault condition.

FIRMWARE UPGRADE

The module's firmware is stored in flash memory so that software/hardware conflicts are avoided, and so that software features may be added in the future.

During a download, Crimson compares its own library of firmware files with those stored in the Master module. If they do not match, Crimson will download the necessary files. The Master then checks to make sure that the I/O modules contain the same firmware. If they contain a different revision, the Master will automatically copy those files into the module's flash memory. During this process, the module LEDs will flash rapidly, starting with the top row, and progressing through the remaining rows until the process is complete.

CONFIGURATION

Programming is done via Crimson, a Windows® compatible configuration interface. Please see the Crimson manual for more information.

ORDERING INFORMATION

TYPE	MODEL NO.	DESCRIPTION	PART NUMBER
Master Module	CSMSTR	Modular Controller Master, Multi Comms ports and Ethernet	CSMSTRV2
		Modular Controller Master with multiple protocol converter, data logger, web server with Virtual HMI up to QVGA (320 x 240) size and expansion slot.	CSMSTRSX
		Modular Controller Master with multiple protocol converter, data logger, web server with Virtual HMI up to VGA (640 x 480) size and expansion slot with increased SDRAM	CSMSTRGT
Analog Output Module	CSOUT[1]	4-Channel Analog Output Module	CSOUT400
Communication Cables (10 feet)	CBL	Programming Cable for CS, G3, & Paradigm Series	CBLPROG0
		Communications Cables[1]	CBLxxxxx
Software		Crimson Programming Software[2]	SFCRM
		Crimson Programming Software, Manual, and Download Cable	SFCRK
Accessories		Rail Stops (Qty 2)	RSRSTP00
		Replacement Base	CSBASE00
		Replacement Termination Plug	CSTERM00

[1] Visit www.redlion.net for a complete list of PID modules, data acquisition modules, communications drivers and cables.

[2] Free at www.redlion.net

red lion

Tel +1 (717) 767-6511
Fax +1 (717) 764-0839
www.redlion.net

MODELS CSMSTRSX AND CSMSTRGT – ENHANCED MODULAR CONTROLLER SERIES MASTER

- *PROVIDES ENHANCED FEATURES FOR DATA ACQUISITION OR MULTI-ZONE PID CONTROL APPLICATIONS*
- *WEBSERVER PROVIDES WORLDWIDE ACCESS TO DATA LOGS AND VIRTUAL HMI*
- *VIRTUAL HMI OFFERS BUILT-IN PC-BASED SCADA FUNCTIONALITY*
- *PERFORMS HIERARCHICAL CONTROL OF OTHER MODULES IN THE MODULAR CONTROLLER SERIES*
- *STORES MODULE CONFIGURATION INFORMATION, AND AUTOMATICALLY REPROGRAMS REPLACED MODULES*
- *EXTENSIVE BUILT-IN DRIVER LIST ALLOWS EASY DATA MAPPING TO PLCs, PCs, AND SCADA SYSTEMS*
- *INDEPENDENT SERIAL PORTS PROVIDE VIRTUALLY UNLIMITED INTEGRATION METHODS*
- *10 BASE-T/100 BASE-TX ETHERNET CONNECTION PROVIDES NETWORKING CAPABILITY*
- *SUPPORTS UP TO 16 MODULAR CONTROLLER SERIES MODULES*
- *COMPACTFLASH® SLOT ALLOWS PROCESS DATA TO BE LOGGED DIRECTLY TO CSV FILES*

C **UL** US LISTED
IND. CONT. EQ.
34AD

GENERAL DESCRIPTION

The Model CSMSTR is a communications and control platform designed for use with Modular Controller Series slave modules. The CSMSTR uses a proprietary high speed serial protocol to communicate, via backplane connection, with up to 16 slave modules. Through the same connection, the Master also provides power to the modules.

When powered up, the CSMSTR automatically identifies and addresses connected slave modules. By storing the configuration information of all of the modules, the CSMSTR is able to automatically configure modules if they are replaced.

The Master provides high-speed RS232/422/485 communication ports and an Ethernet port for connection to PCs, PLCs, and SCADA systems. An extensive list of master and slave protocol drivers are available to allow the CSMSTR to share and exchange variable data with external devices. The 10 Base-T/100 Base-TX Ethernet port can also be used to connect and share data with other devices at high speeds. The virtual HMI feature allows you to create and control an HMI from any networked PC. An onboard CompactFlash slot provides storage for the Master's built-in data logger.

The design of the Modular Controller Series high density packaging and DIN rail mounting saves time and panel space. The controller snaps easily onto standard top hat (T) profile DIN rail.

SOFTWARE

The CSMSTR is programmed with Crimson 2.0 software for Windows® 2000 or later platforms. The software is an easy to use, graphical interface which provides a means of communication configuration, as well as commissioning and calibration of new systems.
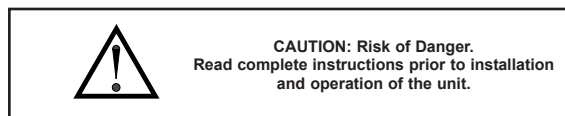
CONTENTS OF PACKAGE

- CS Master
- Termination Plug
- Terminal Block for connecting power.
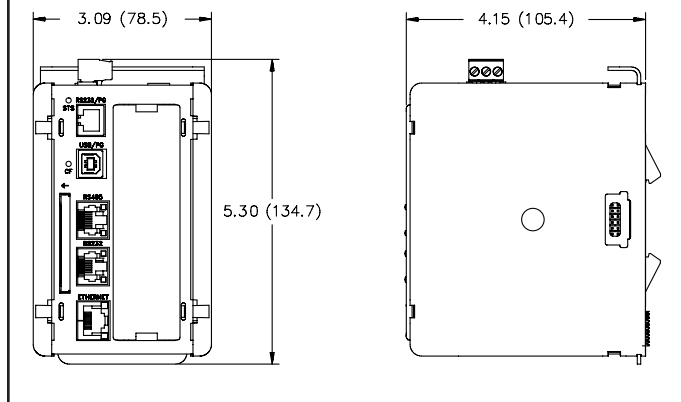
SAFETY SUMMARY

All safety related regulations, local codes and instructions that appear in the manual or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Do not use the controller to directly command motors, valves, or other actuators not equipped with safeguards. To do so can be potentially harmful to persons or equipment in the event of a fault to the controller. An independent and redundant temperature limit indicator with alarm outputs is strongly recommended.

> ⚠ **CAUTION: Risk of Danger.**
> **Read complete instructions prior to installation and operation of the unit.**

CompactFlash is a registered trademark of CompactFlash Association.

DIMENSIONS In inches (mm)

3.09 (78.5)

4.15 (105.4)

5.30 (134.7)

SPECIFICATIONS

1. **POWER**: 24 VDC ± 10%
   400 mA min. (1 module)
   3.5 Amps max. (16 modules + Expansion Card)
   Must use Class 2 or SELV rated power supply.

2. **COMMUNICATIONS**:
   USB/PG Port: Adheres to USB specification 1.1. Device only using Type B connection.
   Serial Ports: Format and Baud Rates for each port are individually software programmable up to 115,200 baud.
   RS232/PG Port: RS232 port via RJ12
   COMMS Ports: RS422/485 port via RJ45, and RS232 port via RJ12
   DH485 TXEN: Transmit enable; open collector, V_{OH} = 15 VDC, V_{OL} = 0.5 V @ 25 mA max.
   Note: For additional information on the communications or signal common and connections to earth ground please see the "Connecting to Earth Ground" in the section "Installing and Powering the CSMSTRSX."
   Ethernet Port: 10 BASE-T / 100 BASE-TX
   RJ45 jack is wired as a NIC (Network Interface Card).

3. **LEDs**:
   STS – Status LED indicates condition of master.
   TX/RX – Transmit/Receive LEDs show serial activity.
   Ethernet – Link and activity LEDs.
   CF – CompactFlash LED indicates card status and read/write activity

4. **MEMORY**:
   On-board User Memory: 4 Mbytes of non-volatile Flash memory.
   On-board SDRAM:
     CSMSTRSX: 2 Mbytes
     CSMSTRGT: 8 Mbytes
   Memory Card: CompactFlash Type II slot for Type I and Type II cards.

5. **REAL-TIME CLOCK**: Typical accuracy is less than one minute per month drift. Crimson 2.0's SNTP facility allows synchronization with external servers.
   Battery: Lithium Coin Cell. Typical lifetime of 10 years at 25 ºC.
     A "Battery Low" system variable is available so that the programmer can choose specific action(s) to occur when the battery voltage drops below its nominal voltage.

6. **ENVIRONMENTAL CONDITIONS**:
   Operating Temperature Range: 0 to 50°C
   Storage Temperature Range: -30 to +70°C
   Operating and Storage Humidity: 80% max relative humidity, non-condensing, from 0 to 50°C
   Vibration According to IEC 68-2-6: 10 to 150 Hz, 0.075 mm amplitude in X, Y, Z direction for 1.5 hours, 1 g.

Shock According to IEC 68-2-27: Operational 25 g, 11 msec in 3 directions.
Altitude: Up to 2000 meters

7. **CONSTRUCTION**: Case body is burgundy high impact plastic and stainless steel. Installation Category I, Pollution Degree 2.

8. **POWER CONNECTION**: Removable wire clamp screw terminal block.
   Wire Gage Capacity: 24 AWG to 12 AWG
   Torque: 4.45 to 5.34 in/lb (0.5 to 0.6 N-m)

9. **MOUNTING**: Snaps onto standard DIN style top hat (T) profile mounting rails according to EN50022 -35 x 7.5 and -35 x 15.

10. **CERTIFICATIONS AND COMPLIANCES**:
    SAFETY
    UL Listed, File #E302106, UL508, CSA 22.2 No. 14-M05
      LISTED by Und. Lab. Inc. to U.S. and Canadian safety standards
    IEC 61010-1, EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1.
    ELECTROMAGNETIC COMPATIBILITY
    Emissions and Immunity to EN 61326: Electrical Equipment for Measurement, Control and Laboratory use.
    Immunity to Industrial Locations:

Electrostatic discharge	EN 61000-4-2	Criterion A [2] 4 kV contact discharge 8 kV air discharge
Electromagnetic RF fields	EN 61000-4-3	Criterion A 10 V/m
Fast transients (burst)	EN 61000-4-4	Criterion A 2 kV power 2 kV signal
Surge	EN 61000-4-5	Criterion A 1kV L-L,2 kV L&N-E power
RF conducted interference	EN 61000-4-6	Criterion A 3 V/rms

Emissions:

Emissions	EN 55011	Class A

Notes:
1. Criterion A: Normal operation within specified limits.
2. This device was designed for installation in an enclosure. To avoid electrostatic discharge to the unit in environments with static levels above 4 kV precautions should be taken when the device is mounted outside an enclosure. When working in an enclosure (ex. making adjustments, setting jumpers etc.) typical anti-static precautions should be observed before touching the unit.

11. **WEIGHT**: 15.1 oz (456.4 g)

ORDERING INFORMATION

TYPE	MODEL NO.	DESCRIPTION	PART NUMBER
Master Module	CSMSTR[1]	Modular Controller Master, Comms, Ethernet	CSMSTRV2
		Modular Controller Master with multiple protocol converter, data logger, web server with Virtual HMI up to QVGA (320 x 240) size and expansion slot.	CSMSTRSX
		Modular Controller Master with multiple protocol converter, data logger, web server with Virtual HMI up to VGA (640 x 480) size and expansion slot with increased SDRAM.	CSMSTRGT
Communications Cables (10 feet)	CBL	RS232 Programming Cable	CBLPROG0
		USB Cable	CBLUSB00
		Communications Cables[1]	CBLxxxxx
Software	SFCRM2	Crimson 2.0 [2], Modular Controller Manual, and Download Cable	SFCRM2MC
Power Supply	PSDR	DIN Rail Mounted Power Supply	PSDRxxxx
Accessories	XCCN	CANopen option card for Modular Controller or Data Station Plus	XCCN0000
	XCDN	DeviceNet option card for Modular Controller or Data Station Plus	XCDN0000
	XCPB	PROFIBUS option card for Modular Controller or Data Station Plus	XCPBDP00
	XCRS	RS232/485 option card for Modular Controller or Data Station Plus	XCRS0000
	G3CF	64 MB CompactFlash Card [3]	G3CF064M
		256 MB CompactFlash Card [3]	G3CF256M
		512 MB CompactFlash Card [3]	G3CF512M
		Rail Stops (Qty 2)	RSRSTP00
		Replacement Base	CSBASE00
		Replacement Termination Plug	CSTERM00

[1] Visit www.redlion.net for a complete list of PID modules, data acquisition modules, communications drivers and cables.

[2] Use this part number to purchase Crimson on CD with a printed Modular Controller Manual, USB cable, and RS-232 cable. Otherwise, download free of charge from www.redlion.net.

[3] Industrial grade two million write cycles.

HARDWARE

INSTALLATION

DIN rail should be mounted horizontally so that the unit's ventilation holes are vertical in relation to cabinet orientation. A minimum clearance of 1 inch (25.4 mm) should be maintained above and below the unit in order to ensure proper thermal regulation.
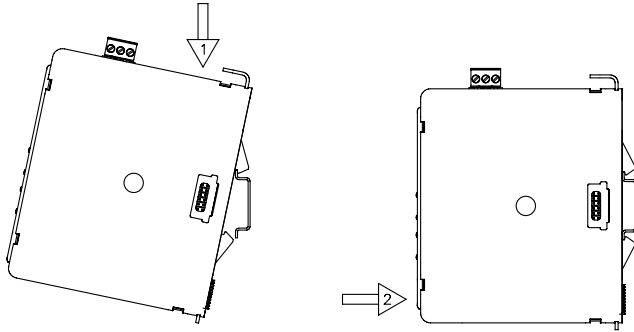
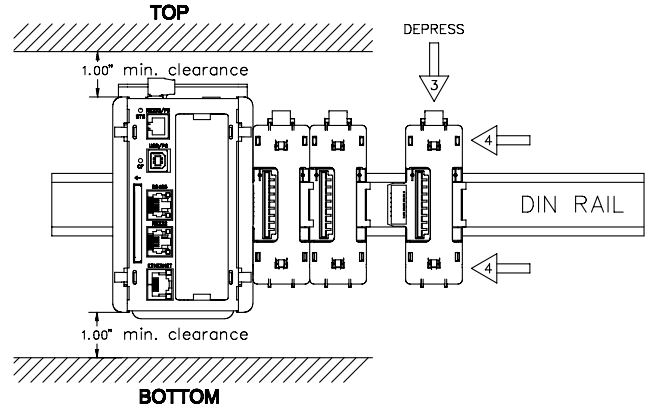**Figure 1 - Attach CSMSTR Master To DIN Rail**
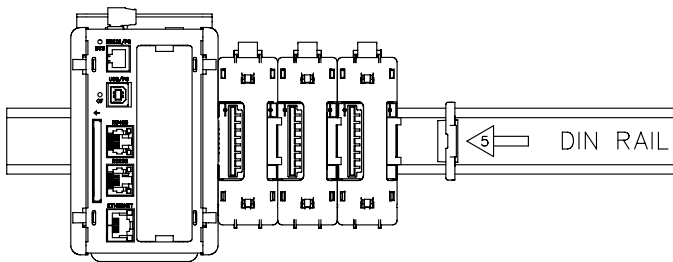
Figure 2 - Attach Slave Bases To DIN Rail

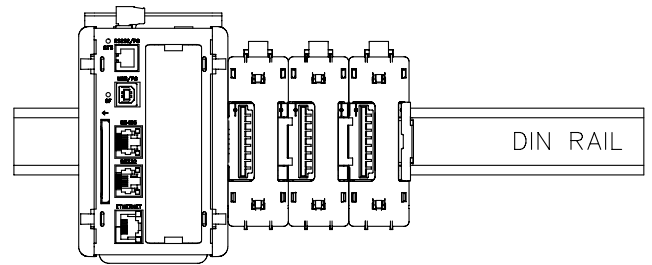**Figure 3 - Attach Termination Plug***
* Supplied with CSMSTR Master Module.

Figure 4 - Installation Complete

COMPACTFLASH® CARD

CompactFlash socket is a Type II socket that can accept either Type I or II cards. Use cards with a minimum of 4 Mbytes and a maximum of 2 Gbytes with the Master's CompactFlash socket. Cards are available at most computer and office supply retailers. CompactFlash can be used for configuration transfers, data logging, and trending.

CompactFlash— Insert Top Side Towards Left
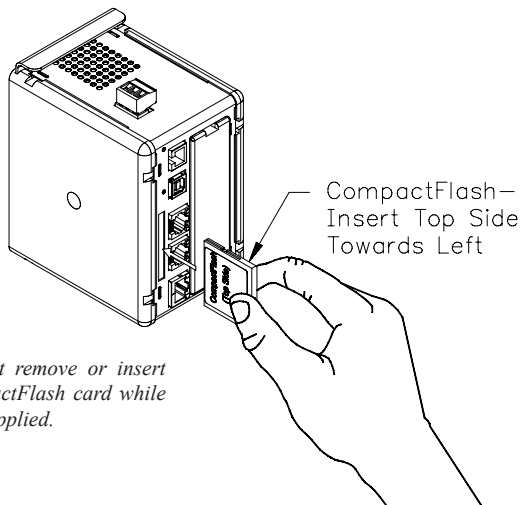
Note: Do not remove or insert the CompactFlash card while power is applied.

Information stored on a CompactFlash card can be read by a card reader attached to a PC. This information is stored in IBM (Windows®) PC compatible FAT16 file format.

POWER SUPPLY REQUIREMENTS

It is very important that the power supply is mounted correctly if the unit is to operate reliably. Please take care to observe the following points:

– The power supply must be mounted close to the unit, with usually not more than 6 feet (1.8 m) of cable between the supply and the master. Ideally, the shortest length possible should be used.
– The wire used to connect the master's power supply should be at least 22-gage wire. If a longer cable run is used, a heavier gage wire should be used. The routing of the cable should be kept away from large contactors, inverters, and other devices which may generate significant electrical noise.
– A power supply with a Class 2 or SELV rating is to be used. A Class 2 or SELV power supply provides isolation to accessible circuits from hazardous voltage levels generated by a mains power supply due to single faults. SELV is an acronym for "safety extra-low voltage." Safety extra-low voltage circuits shall exhibit voltages safe to touch both under normal operating conditions and after a single fault, such as a breakdown of a layer of basic insulation or after the failure of a single component has occurred.

Visit www.redlion.net for a complete list of our PSDR Series of Class 2 power supplies.

NOTE

For reliable operation in all of our products, Red Lion recommends the use of SanDisk® and SimpleTech brands of CompactFlash cards.

Industrial grade versions that provide up to two million write/erase cycles minimum are available from Red Lion.

EMC INSTALLATION GUIDELINES

Although Red Lion Controls Products are designed with a high degree of immunity to Electromagnetic Interference (EMI), proper installation and wiring methods must be followed to ensure compatibility in each application. The type of the electrical noise, source or coupling method into a unit may be different for various installations. Cable length, routing, and shield termination are very important and can mean the difference between a successful or troublesome installation. Listed are some EMI guidelines for a successful installation in an industrial environment.

1. To reduce the chance of noise spikes entering the unit via the power lines, connections should be made to a clean source. Connecting to circuits that also power loads such as contactors, relays, motors, solenoids etc. should be avoided.
2. The unit should be mounted in a metal enclosure, which is properly connected to protective earth.
3. Use shielded (screened) cables for all Signal and Control inputs. The shield (screen) pigtail connection should be made as short as possible. The connection point for the shield depends somewhat upon the application. Listed below are the recommended methods of connecting the shield, in order of their effectiveness.
   a. Connect the shield to earth ground (protective earth) at one end where the unit is mounted.
   b. Connect the shield to earth ground at both ends of the cable, usually when the noise source frequency is over 1 MHz.
   c. Connect the shield to common of the master and leave the other end of the shield unconnected and insulated from earth ground.

4. Never run Signal or Control cables in the same conduit or raceway with AC power lines, conductors feeding motors, solenoids, SCR controls, and heaters, etc. The cables should be run through metal conduit that is properly grounded. This is especially useful in applications where cable runs are long and portable two-way radios are used in close proximity or if the installation is near a commercial radio transmitter. Also, Signal or Control cables within an enclosure should be routed as far away as possible from contactors, control relays, transformers, and other noisy components.
5. Long cable runs are more susceptible to EMI pickup than short cable runs. Therefore, keep cable runs as short as possible.
6. In extremely high EMI environments, the use of external EMI suppression devices is effective. The following EMI suppression devices (or equivalent) are recommended:
   Ferrite Suppression Cores for signal and control cables:
      Fair-Rite part number 0443167251 (RLC part number FCOR0000)
      TDK part number ZCAT3035-1330A
      Steward part number 28B2029-0A0
   Line Filters for input power cables:
      Schaffner part number FN610-1/07 (RLC part number LFIL0000)
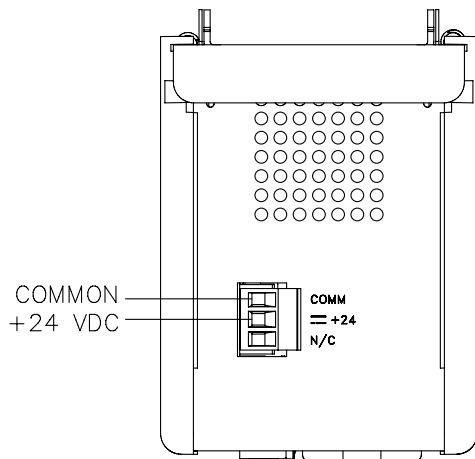   Schaffner part number FN670-1.8/07
      Corcom part number 1 VR3

Visit RLC's web site at www.redlion.net for more information on EMI guidelines, Safety and CE issues as they relate to Red Lion Controls products.
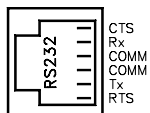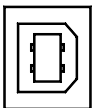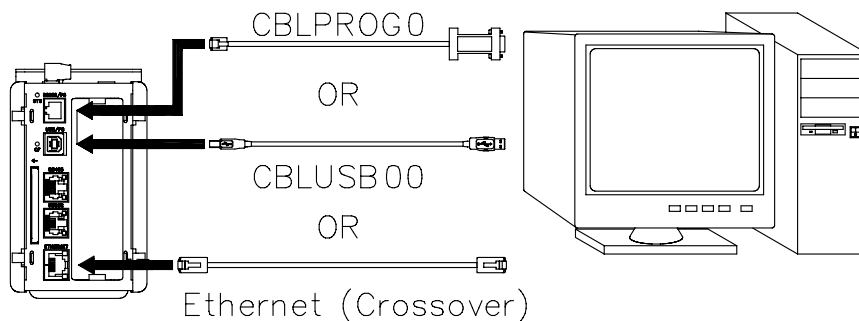
WIRING
POWER CONNECTION

COMMON
+24 VDC

COMM
+24
N/C

PROGRAMMING PORTS

RS232/PG

RS232
CTS
Rx
COMM
COMM
Tx
RTS

USB/PG

ETHERNET

GREEN/AMBER LED

YELLOW LED

CBLPROG0

OR

CBLUSB00

OR

Ethernet (Crossover)

COMMUNICATION PORTS

RS232/PG

CTS
Rx
COMM
COMM
Tx
RTS

RS232

CBLPROG0

OR

CBLxxxxx*

RS232

RTS
Tx
COMM
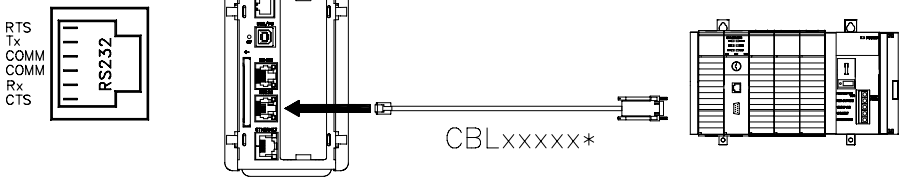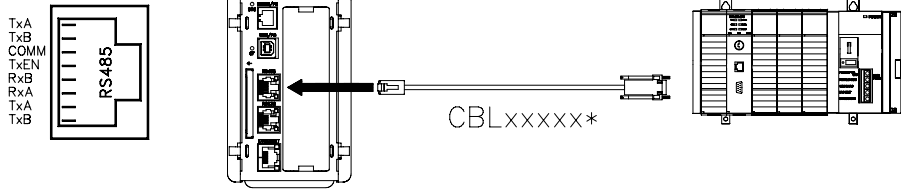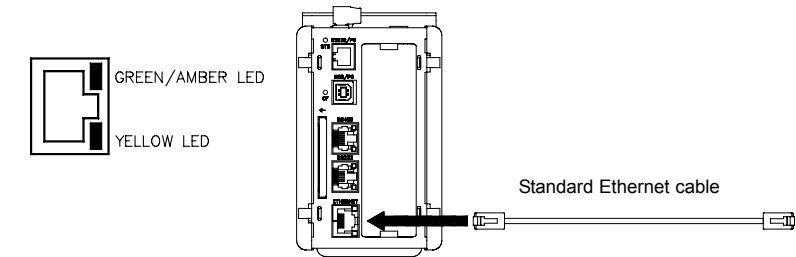COMM
Rx
CTS

RS232

CBLxxxxx*

* Use appropriate communications cable. See Ordering Information for descriptions of the available cables.

WARNING: Do **NOT** use a standard DH-485 cable to connect this port to Allen Bradley equipment.

RS485

TxA
TxB
COMM
TxEN
RxB
RxA
TxA
TxB

RS485

CBLxxxxx*

PORT 3 - ETHERNET CONNECTION

GREEN/AMBER LED

YELLOW LED

Standard Ethernet cable

MASTER PORT PIN OUTS

TROUBLESHOOTING

If for any reason you have trouble operating, connecting, or simply have questions concerning your new Master, contact Red Lion's technical support. For contact information, refer to the back page of this bulletin for phone and fax numbers.

EMAIL: techsupport@redlion.net
Web Site: http://www.redlion.net

COMMUNICATING WITH THE MASTER

CONFIGURING A MASTER

The Master is configured using Crimson 2.0 software. Crimson 2.0 is available as a free download from Red Lion's website, or it can be ordered on CD. Updates to Crimson 2.0 for new features and drivers are posted on the website as they become available. By configuring the Master using the latest version of Crimson 2.0, you are assured that your unit has the most up to date feature set. Crimson 2.0 software can configure the Master through the RS232/PG port, USB/PG port, Ethernet or CompactFlash. The USB/PG port is connected using a standard USB cable with a Type B connector.

The driver needed to use the USB port will be installed with Crimson 2.0. The RS232/PG port uses a programming cable made by Red Lion to connect to the DB9 COM port of your computer. If making your own cable, refer to the "Master Port Pin Outs" for wiring information.

The CompactFlash can be used to program a Master by placing a configuration file and firmware on the CompactFlash card. The card is then inserted into the target Master and powered. Refer to the Crimson 2.0 literature for more information on the proper names and locations of the files.

CABLES AND DRIVERS

Red Lion has a wide range of cables and drivers for use with many different communication types. A list of these drivers and cables along with pin outs is available from Red Lion's website. New cables and drivers are added on a regular basis. If making your own cable, refer to the "Master Port Pin Outs" for wiring information.

USB, DATA TRANSFERS FROM THE COMPACTFLASH CARD

In order to transfer data from the CompactFlash card via the USB port, a driver must be installed on your computer. This driver is installed with Crimson 2.0 and is located in the folder C:\Program Files\Red Lion Controls\Crimson 2.0\Device\ after Crimson 2.0 is installed. This may have already been accomplished if your Master was configured using the USB port.

Once the driver is installed, connect the Master to your PC with a USB cable, and follow "Mounting the CompactFlash" instructions in the Crimson 2.0 user manual.

Note that using the USB port for frequent data transfers is not recommended. For frequent data transfers it is recommended that the Ethernet connection be used. Through the Ethernet connection a web page can be set up to view logged data. Refer to the Crimson 2.0 manual for details.

Note: The USB port is for system set-up and diagnostics and is not intended for permanent connection.

ETHERNET COMMUNICATIONS

Ethernet communications can be established at either 10 BASE-T or 100 BASE-TX. The Master's RJ45 jack is wired as a NIC (Network Interface Card).

For example, when wiring to a hub or switch use a straight-through cable, but when connecting to another NIC use a crossover cable.

The Crimson 2.0 manual contains additional information on Ethernet communications.

RS232 PORTS

The Master has two RS232 ports. There is the RS232/PG port and the COMMS port. Although only one of these ports can be used for programming, both ports can be used for communications with a PLC. The RS232/PG port can be used for either master or slave protocols.

RS422/485 PORT

The Master has one RS422/485 port. This port can be configured to act as either RS422 or RS485.

Note: All Red Lion devices connect A to A and B to B, except for Paradigm devices. Refer to www.redlion.net for additional information.

DH485 COMMUNICATIONS

The Master's RS422/485 COMMS port can also be used for Allen Bradley DH485 communications.

WARNING: DO NOT use a standard DH485 cable to connect this port to Allen Bradley equipment. A cable and wiring diagram are available from Red Lion.

LEDS

STS – STATUS LED

The green Status LED provides information regarding the state of the Master, as well as the rest of the system. This includes indication of the various stages of the start-up routine (power-up), and any errors that may occur.

Startup Routine

	INDICATION
Rapidly Flashing	Master is currently running the boot loader and/or being flash upgraded by Crimson.
Steady	Master is operating properly.

Error States

LED	INDICATION
1 blink, pause, repeat	One or more slave modules are missing from the system. Master and installed modules will perform normally in this state.
2 blinks, pause, repeat	Missing configuration, or configuration being updated by Crimson.
3 blinks, pause, repeat	Quantity of module bases does not match configuration file. Master will not communicate with the modules until the error is corrected.
4 blinks, pause, repeat	Termination plug not installed, or one or more bases are malfunctioning. Master will not communicate with the modules until the plug is reinstalled, and power is cycled.

CF LED

LED	INDICATION
Off	No CompactFlash Card is present.
Steady	Valid CompactFlash card is present.
Flashing Rapidly	CompactFlash card is being checked.
Flickering	Unit is writing to the CompactFlash, either because it is storing data, or because the PC connected via the USB port has locked the drive. [1]
Flashing Slowly	Incorrectly formatted CompactFlash card present.

1. Do not turn off power to the unit while this light is flickering. The unit writes data in two minute intervals. Later Microsoft operating systems will not lock the drive unless they need to write data; Windows 98 may lock the drive any time it is mounted, thereby interfering with logging. Refer to "Mounting the CompactFlash" in the Crimson 2.0 User Manual.

USER COMMUNICATION PORTS - TX/RX LEDS

LED	INDICATION
GREEN	Transmitting
RED	Receiving

Note: LEDs are not available on the Programming Port: RS232/PG.

ETHERNET LEDS

LED	INDICATION
YELLOW (Solid)	Link Established
YELLOW (Flashing)	Network Activity
GREEN	10 BASE-T Communications
AMBER	100 BASE-TX Communications

LIMITED WARRANTY

The Company warrants the products it manufactures against defects in materials and workmanship for a period limited to two years from the date of shipment, provided the products have been stored, handled, installed, and used under proper conditions. The Company's liability under this limited warranty shall extend only to the repair or replacement of a defective product, at The Company's option. The Company disclaims all liability for any affirmation, promise or representation with respect to the products.

The customer agrees to hold Red Lion Controls harmless from, defend, and indemnify RLC against damages, claims, and expenses arising out of subsequent sales of RLC products or products containing components manufactured by RLC and based upon personal injuries, deaths, property damage, lost profits, and other matters which Buyer, its employees, or sub-contractors are or may be to any extent liable, including without limitation penalties imposed by the Consumer Product Safety Act (P.L. 92-573) and liability imposed upon any person pursuant to the Magnuson-Moss Warranty Act (P.L. 93-637), as now in effect or as amended hereafter.

No warranties expressed or implied are created with respect to The Company's products except those expressly contained herein. The Customer acknowledges the disclaimers and limitations contained herein and relies on no other warranties or affirmations.

red lion

Tel +1 (717) 767-6511
Fax +1 (717) 764-0839
www.redlion.net

MODEL CSDIO - MODULAR CONTROLLER
SERIES DIGITAL MODULE
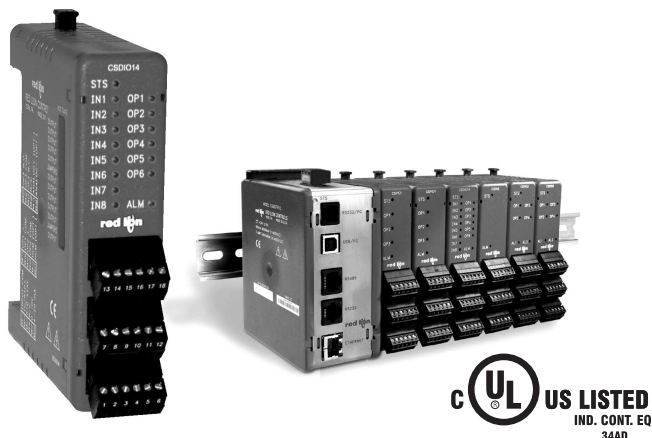
- *ADDS REMOTE I/O CAPABILITY TO THE MODULAR CONTROLLER SERIES*
- *EIGHT INPUT, SIX OUTPUT DIGITAL MODULE*
- *INPUTS ISOLATED FROM OUTPUTS*
- *INPUTS INDEPENDENTLY SWITCH SELECTABLE FOR SINK OR SOURCE SIGNALS*
- *INPUTS INDEPENDENTLY CONFIGURABLE FOR HIGH OR LOW ACTIVE STATE*
- *INPUTS INDEPENDENTLY SWITCH SELECTABLE FOR HIGH OR LOW FREQUENCY SIGNALS*
- *RELAY OR NFET OUTPUT MODELS AVAILABLE*

C UL US LISTED
IND. CONT. EQ.
34AD

CE

GENERAL DESCRIPTION

The Model CSDIO series modules are digital I/O modules designed for use with the Modular Controller Series. The CSDIO14 offers eight inputs and six outputs that can be used to monitor contact or sensor inputs and actuate relays, solenoids, PLC inputs, etc.

The inputs accept standard DC inputs or contact closures, and are configured for Sink/Source signals via external switches. Additionally, each input has a switch selectable input filter that can be used to prevent contact bounce. Each input may also be software configured as a high-active or low-active input.

The modules are available with relay or NFET outputs that are capable of switching up to one amp each (NFET DC only). For applications requiring large loads to be controlled, several DIN rail mount relays are available.

The CSDIO modules connect and communicate via a backplane connection to the CSMSTR Modular Controller Series Master. The CSMSTR, equipped with serial ports as well as an Ethernet port, allows the system to share data with PCs, PLCs, and SCADA systems. The Master supports any combination of up to 16 CS Series modules.

Internal power management circuits allow the modules to be replaced while power is applied, which reduces downtime in the event of a relay failure. All configuration information is stored locally within each module, as well as in the Master, so replacement modules do not need to be configured. The Modular Controller Series' high density packaging and DIN rail mounting saves time and panel space. The backplane connection provides power and communication to the module and snaps easily onto standard top hat (T) profile DIN rail.

CONFIGURATION

The Modular Controller Series is configured with Windows® compatible Crimson™ software. The software is an easy to use, graphical interface that provides a means of communication configuration, as well as commissioning and calibration of new systems.

SAFETY SUMMARY

All safety related regulations, local codes and instructions that appear in the manual or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Do not use the module to directly command motors, valves, or other actuators not equipped with safeguards. To do so can be potentially harmful to persons or equipment in the event of a fault to the module.

CAUTION: Risk of Danger.
Read complete instructions prior to installation and operation of the unit.

CAUTION: Risk of electric shock.

DIMENSIONS In inches (mm)

1.24 (31.5)

4.17 (105.9)

4.98 (126.5)

GENERAL SPECIFICATIONS

1. **POWER**: Derived from system backplane. (CSDIO draws 170 mA max. load on power input of MASTER). Modules may be hot-swapped (replaced while powered up).
2. **LEDs**:
    STS - Status LED shows module condition.
    IN1-IN8 - LEDs are lit when associated input is active.
    OP1-OP6 - LEDs are lit when associated output is active.
    ALM - Alarm LED is lit when an internal alarm condition exists.
3. **MEMORY**: Non-volatile memory retains all programmable parameters. MASTER also stores the parameters in order to reprogram modules that are replaced.
4. **INPUTS**: DIP switch selectable for sink or source
    Maximum voltage: +30 VDC, reverse polarity protected
    Off Voltage: < 1.2 Volts
    On Voltage: > 3.8 Volts
    Input Impedance: Source Mode 10K ohms; Sink Mode 20K ohms
    Input Frequency*:
        Filter switch on: 50 Hz
        Filter switch off: 300 Hz
        * Actual useable frequency limited by communication to external device.
5. **OUTPUTS**: Outputs available as FORM-A relay or Solid State NFET.
    Form A Relay Output:
        Type: N.O.
        The following pairs of relays share the common terminal: 1&2, 3&4, 5&6
        Current Rating by pair: 3 Amps @ 30 VDC / 125 VAC resistive
        1/10 HP @ 125 VAC
        Life Expectancy: 200,000 cycles at maximum load rating. (Decreasing load, increasing cycle time, and use of surge suppression such as RC snubbers increases life expectancy.)
    Solid State Output:
        Type: Switched DC, N Channel open drain MOSFET
        Contact Rating: 1 ADC max
        VDS ON: < 0.2 V @ 1 A
        VDS MAX: 30 VDC
        Offstate Leakage Current: 0.5 µA max
6. **LOGIC (BOOLEAN) MODE**:
    Count Frequency: 200 Hz/input when input is directly connected (soft-wired) to the counter.
    Logic Propagation Delay: 400 msecs. max.
    Timer Accuracy: 0.2%
7. **ISOLATION LEVEL**: 500 Vrms @ 50/60 Hz for 1 minute between the following:
    Inputs
    Outputs
    CS Master Power Supply Input
8. **COMMUNICATIONS**: Provided by the CS Master

9. **ENVIRONMENTAL CONDITIONS**:
    Operating Temperature Range: 0 to +50°C
    Storage Temperature Range: -40 to +85°C
    Operating and Storage Humidity: 85% max relative humidity, non-condensing, from 0 to +50°C
    Vibration According to IEC 68-2-6: 10 to 150 Hz, 0.075 mm amplitude in X, Y, Z direction 1 g.
    Shock According to IEC 68-2-27: Operational 25 g (10g relay), 11 msec in 3 directions.
    Altitude: Up to 2000 meters
10. **CERTIFICATIONS AND COMPLIANCES**:
    SAFETY
        UL Listed, File # E302106, UL508, CSA C22.2 No. 14-M05
            LISTED by Und. Lab. Inc. to U.S. and Canadian safety standards
        IEC 61010-1, EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1.
    ELECTROMAGNETIC COMPATIBILITY
        Emissions and Immunity to EN 61326: Electrical Equipment for Measurement, Control and Laboratory use.

Immunity:

Electrostatic discharge	EN 61000-4-2	Criterion B
		4 kV contact discharge
		8 kV air discharge
Electromagnetic RF fields	EN 61000-4-3	Criterion A
		10 V/m
Fast transients (burst)	EN 61000-4-4	Criterion A
		2 kV power
		1 kV signal
Surge	EN 61000-4-5	Criterion A
		1 kV L-L,
		2 kV L&N-E power
RF conducted interference	EN 61000-4-6	Criterion A
		3 V/rms

Emissions:

Emissions	EN 55011	Class A

Notes:
  1. Criterion A: Normal operation within specified limits.
  2. Criterion B: Temporary loss of performance from which the unit self-recovers.
  3. Power supplied from back plane via Master Module.

11. **CONSTRUCTION**: Case body is burgundy high impact plastic. Installation Category I, Pollution Degree 2.
12. **CONNECTIONS**: Removable wire clamp screw terminal blocks.
    Wire Gage: 28-16 AWG terminal gage wire
    Torque: 1.96-2.23 inch/lbs (0.22-0.25 N-m)
13. **MOUNTING**: Snaps on to standard DIN style top hat (T) profile mounting rails according to EN50022 -35 x 7.5 and -35 x 15.
14. **WEIGHT**: 6.6 oz (187.1 g)

BLOCK DIAGRAM

EMC INSTALLATION GUIDELINES

Although Red Lion Controls Products are designed with a high degree of immunity to Electromagnetic Interference (EMI), proper installation and wiring methods must be followed to ensure compatibility in each application. The type of the electrical noise, source or coupling method into a unit may be different for various installations. Cable length, routing, and shield termination are very important and can mean the difference between a successful or troublesome installation. Listed are some EMI guidelines for a successful installation in an industrial environment.

1. A unit should be mounted in a metal enclosure, which is properly connected to protective earth.
   a. The mounting clip that connects to the DIN rail should have the DIN rail connected to protective earth.
2. Use shielded (screened) cables for all Signal and Control inputs. The shield (screen) pigtail connection should be made as short as possible. The connection point for the shield depends somewhat upon the application. Listed below are the recommended methods of connecting the shield, in order of their effectiveness.
   a. Connect the shield to earth ground (protective earth) at one end where the unit is mounted.
   b. Connect the shield to earth ground at both ends of the cable, usually when the noise source frequency is over 1 MHz.
   c. Connect the shield to common of the module and leave the other end of the shield unconnected and insulated from earth ground.
3. Never run Signal or Control cables in the same conduit or raceway with AC power lines, conductors, feeding motors, solenoids, SCR controls, and heaters, etc. The cables should be run through metal conduit that is properly grounded. This is especially useful in applications where cable runs are long and portable two-way radios are used in close proximity or if the installation is near a commercial radio transmitter. Also, Signal or Control cables within an enclosure should be routed as far away as possible from contactors, control relays, transformers, and other noisy components.
4. Long cable runs are more susceptible to EMI pickup than short cable runs. Therefore, keep cable runs as short as possible.

5. In extremely high EMI environments, the use of external EMI suppression devices such as Ferrite Suppression Cores for signal and control cables is effective. The following EMI suppression devices (or equivalent) are recommended:
   Fair-Rite part number 0443167251 (RLC part number FCOR0000)
   TDK part number ZCAT3035-1330A
   Steward part number 28B2029-0A0
6. To protect relay contacts that control inductive loads and to minimize radiated and conducted noise (EMI), some type of contact protection network is normally installed across the load, the contacts or both. The most effective location is across the load.
   a. Using a snubber, which is a resistor-capacitor (RC) network or metal oxide varistor (MOV) across an AC inductive load is very effective at reducing EMI and increasing relay contact life.
   b. If a DC inductive load (such as a DC relay coil) is controlled by a transistor switch, care must be taken not to exceed the breakdown voltage of the transistor when the load is switched. One of the most effective ways is to place a diode across the inductive load. Most RLC products with solid state outputs have internal zener diode protection. However external diode protection at the load is always a good design practice to limit EMI. Although the use of a snubber or varistor could be used.
   RLC part numbers: Snubber SNUB0000
   Varistor ILS11500 or ILS23000
   Note: Reference manufacturer's instructions when installing any EMI suppression device.
7. Also, care should be taken when connecting input and output devices to the instrument. When a separate input and output common is provided, they should not be mixed. Therefore a sensor common should NOT be connected to an output common. This would cause EMI on the sensitive input common, which could effect the instrument's operation.

Visit RLC's web site at www.redlion.net for more information on EMI guidelines, Safety and CE issues as they relate to Red Lion Controls products.

HARDWARE
INPUT SWITCHES

Each input is independently configurable for sinking or sourcing signals. A filter capacitor is also selectable for avoiding contact bounce.
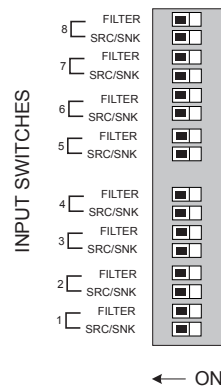
SRC/SNK:
ON-SRC - Connects an internal 10KΩ pull-down resistor to common.
OFF-SNK - Connects an internal 20KΩ pull-up resistor to +5V.

FILTER:
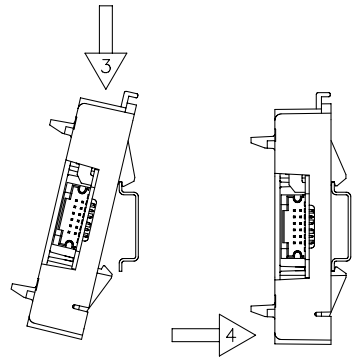ON - Connects a capacitor to the input, thereby reducing the input response to 50 Hz.
OFF - Provides maximum input response of 300 Hz.
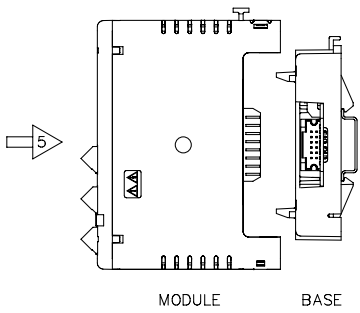
HARDWARE INSTALLATION
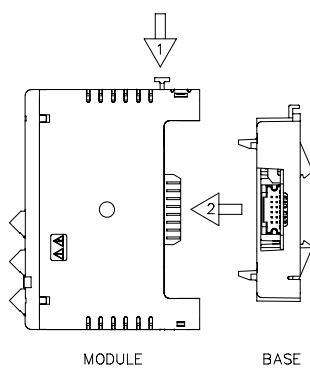
### SEPARATE BASE FROM MODULE

MODULE   BASE

ATTACH THE MODULE BASE TO THE DIN RAIL

ATTACH MODULE TO BASE

MODULE   BASE

WIRING

### WIRING CONNECTIONS

All conductors should meet voltage and current ratings for each terminal. Also, cabling should conform to appropriate standards of good installation, local codes and regulations. When wiring the module, use the numbers on the label to identify the position number with the proper function. Strip the wire, leaving approximately 1/4" (6 mm) of bare wire exposed. Insert the wire into the terminal, and tighten.

Terminals 13 to 18
Terminals 7 to 12
Terminals 1 to 6
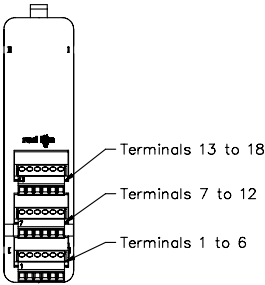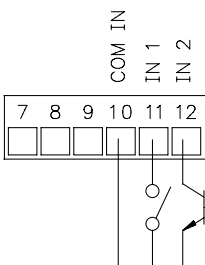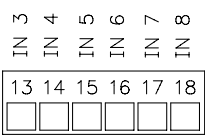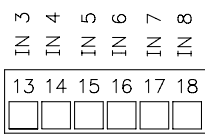
INPUT CONNECTIONS

Sinking Input
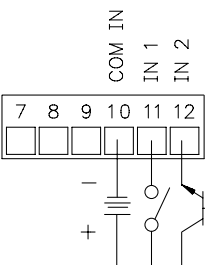
Sourcing Input

OUTPUT CONNECTIONS
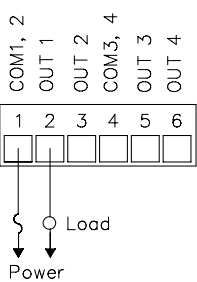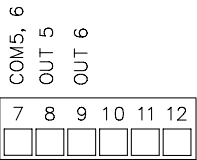
Relay Version
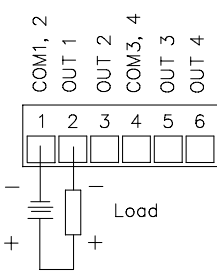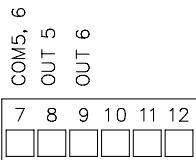
Solid State NFET Version

LEDS

STS – STATUS LED

The Status LED is a dual color LED that provides information regarding the state of the module. This includes indication of the various stages of the start-up routine (power-up), as well as any errors that may occur.

Startup Routine

Rapidly Flashing Red	Module is currently running the boot loader and/or being flash upgraded by Crimson. This occurs for four seconds during a power up.
Steady Red	Module switching to configuration.
Green	Module performing normally.

Error States

Solid Red	Module not controlling, and not communicating.
Green/Pulsing Red	Module is controlling properly, but has lost communication with the Master.

ALM – ALARM LED

The Alarm LED indicates the presence of a fault condition.

FIRMWARE UPGRADE

The module's firmware is stored in flash memory so that software/hardware conflicts are avoided, and so that software features may be added in the future.

During a download, Crimson compares its own library of firmware files with those stored in the Master module. If they do not match, Crimson will download the necessary files. The Master then checks to make sure that the I/O modules contain the same firmware. If they contain a different revision, the Master will automatically copy those files into the module's flash memory. During this process, the module LEDs will flash rapidly, starting with the top row, and progressing through the remaining rows until the process is complete.

CONFIGURATION

Programming is done via Crimson, a Windows® compatible configuration interface. Please see the Crimson manual for more information.

ORDERING INFORMATION

TYPE	MODEL NO.	DESCRIPTION	PART NUMBER
Master Module	CSMSTR	Modular Controller Master, Multi Comms ports and Ethernet	CSMSTRV2
		Modular Controller Master with multiple protocol converter, data logger, web server with Virtual HMI up to QVGA (320 x 240) size and expansion slot.	CSMSTRSX
		Modular Controller Master with multiple protocol converter, data logger, web server with Virtual HMI up to VGA (640 x 480) size and expansion slot with increased SDRAM	CSMSTRGT
Digital Modules	CSDIO14[1]	Eight Inputs, Six Relay Outputs	CSDIO14R
		Eight Inputs, Six Solid State Outputs	CSDIO14S
Communication Cables (10 feet)	CBL	Programming Cable for CS, G3, & Paradigm Series	CBLPROG0
		Communications Cables[1]	CBLxxxxx
Software		Crimson Programming Software[2]	SFCRM
		Crimson Programming Software, Manual, and Download Cable	SFCRK
Accessories		Rail Stops (Qty 2)	RSRSTP00
		Replacement Base	CSBASE00
		Replacement Termination Plug	CSTERM00

[1] Visit www.redlion.net for a complete list of PID modules, data acquisition modules, communications drivers and cables.

[2] Free at www.redlion.net

This page intentionally left blank

This page intentionally left blank

LIMITED WARRANTY

red lion

Tel +1 (717) 767-6511
Fax +1 (717) 764-0839
www.redlion.net

MODEL CSMSTRV2 – MODULAR CONTROLLER SERIES MASTER

- PERFORMS HIERARCHICAL CONTROL OF OTHER MODULES IN THE MODULAR CONTROLLER SERIES
- PROVIDES POWER AND COMMUNICATIONS TO MODULES THROUGH BACKPLANE CONNECTOR
- STORES MODULE CONFIGURATION INFORMATION, AND AUTOMATICALLY REPROGRAMS REPLACED MODULES
- EXTENSIVE BUILT-IN DRIVER LIST ALLOWS EASY DATA MAPPING TO PLCs, PCs, AND SCADA SYSTEMS
- INDEPENDENT SERIAL PORTS PROVIDE VIRTUALLY UNLIMITED INTEGRATION METHODS
- 10 BASE-T/100 BASE-TX ETHERNET CONNECTION PROVIDES NETWORKING CAPABILITY
- SUPPORTS UP TO 16 MODULAR CONTROLLER SERIES MODULES
- SUPPORTED BY CRIMSON 2.0 SOFTWARE (OLDER CRIMSON 1.0 FILES MAY BE IMPORTED INTO CRIMSON 2.0)

C **UL** US LISTED
IND. CONT. EQ.
34AD

C E

GENERAL DESCRIPTION

The Model CSMSTRV2 is a communications and control platform designed for use with Modular Controller Series slave modules. The CSMSTRV2 uses a proprietary high speed serial protocol to communicate, via backplane connection, with up to 16 slave modules. Through the same connection, the Master also provides power to the modules.

When powered up, the CSMSTRV2 automatically identifies and addresses connected slave modules. By storing the configuration information of all of the modules, the CSMSTRV2 is able to automatically configure modules if they are replaced.

The Master provides high-speed RS232/422/485 communication ports and an Ethernet port for connection to PCs, PLCs, and SCADA systems. An extensive list of master and slave protocol drivers are available to allow the CSMSTRV2 to share and exchange variable data with external devices. The 10 Base-T/100 Base-TX Ethernet port can also be used to connect and share data with other devices at high speeds.

The CSMSTRV2 was designed as a direct replacement for the original CSMSTRSE. This new model provides benefits such as support via Crimson 2.0 software, which allows configuration files to be uploaded. To save programming time, files originally created in Crimson 1.0 (.cdb files) may be imported into Crimson 2.0.

The design of the Modular Controller Series high density packaging and DIN rail mounting saves time and panel space. The controller snaps easily onto standard top hat (T) profile DIN rail.

SOFTWARE

The CSMSTRV2 is programmed with Crimson 2.0 software for Windows® 2000 or later platforms. The software is an easy to use, graphical interface which provides a means of communication configuration, as well as commissioning and calibration of new systems.

CONTENTS OF PACKAGE

- CS Master
- Termination Plug
- Terminal Block for connecting power.

SAFETY SUMMARY

All safety related regulations, local codes and instructions that appear in the manual or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Do not use the controller to directly command motors, valves, or other actuators not equipped with safeguards. To do so can be potentially harmful to persons or equipment in the event of a fault to the controller. An independent and redundant temperature limit indicator with alarm outputs is strongly recommended.

DIMENSIONS In inches (mm)
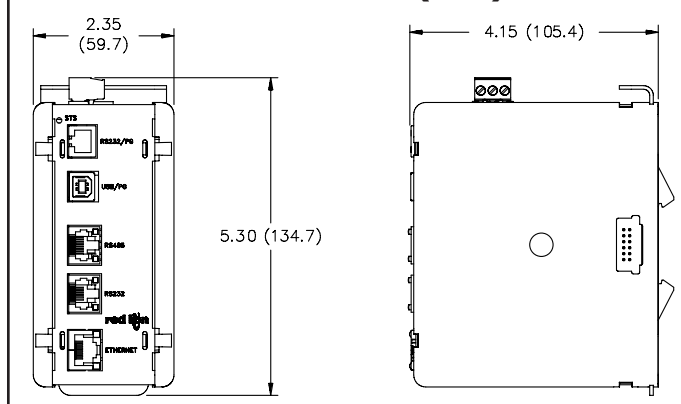
2.35 (59.7)

5.30 (134.7)

4.15 (105.4)

⚠ **CAUTION: Risk of Danger.**
Read complete instructions prior to installation and operation of the unit.

1

SPECIFICATIONS

1. **POWER**: 24 VDC ± 10%
   400 mA min. (1 module)
   3 Amps max. (16 modules)
   Must use Class 2 or SELV rated power supply.
2. **COMMUNICATIONS**:
   USB/PG Port: Adheres to USB specification 1.1. Device only using Type B connection.
   Serial Ports: Format and Baud Rates for each port are individually software programmable up to 115,200 baud.
   RS232/PG Port: RS232 port via RJ12
   COMMS Ports: RS422/485 port via RJ45, and RS232 port via RJ12
   DH485 TXEN: Transmit enable; open collector, V_{OH} = 15 VDC,
   V_{OL} = 0.5 V @ 25 mA max.
   Note: For additional information on the communications or signal common and connections to earth ground please see the "Connecting to Earth Ground" in the section "Installing and Powering the CSMSTRSX."
   Ethernet Port: 10 BASE-T / 100 BASE-TX
   RJ45 jack is wired as a NIC (Network Interface Card).
3. **LEDs**:
   STS – Status LED indicates condition of master.
   TX/RX – Transmit/Receive LEDs show serial activity.
   Ethernet – Link and activity LEDs.
4. **MEMORY**:
   On-board User Memory: 4 Mbytes of non-volatile Flash memory.
   On-board SDRAM: 2 Mbytes
5. **ENVIRONMENTAL CONDITIONS**:
   Operating Temperature Range: 0 to 50°C
   Storage Temperature Range: -30 to +70°C
   Operating and Storage Humidity: 80% max relative humidity, non-condensing, from 0 to 50°C
   Vibration According to IEC 68-2-6: 5 to 150 Hz, in X, Y, Z direction for 1.5 hours, 2 g's.
   Shock According to IEC 68-2-27: Operational 25 g, 11 msec in 3 directions.
   Altitude: Up to 2000 meters
6. **CONSTRUCTION**: Case body is burgundy high impact plastic and stainless steel. Installation Category I, Pollution Degree 2.

7. **POWER CONNECTION**: Removable wire clamp screw terminal block.
   Wire Gage Capacity: 24 AWG to 12 AWG
   Torque: 4.45 to 5.34 in/lb (0.5 to 0.6 N-m)
8. **MOUNTING**: Snaps onto standard DIN style top hat (T) profile mounting rails according to EN50022 -35 x 7.5 and -35 x 15.
9. **CERTIFICATIONS AND COMPLIANCES**:
   SAFETY
   UL Listed, File #E302106, UL508, CSA 22.2 No. 14-M05
   LISTED by Und. Lab. Inc. to U.S. and Canadian safety standards
   IEC 61010-1, EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1.
   ELECTROMAGNETIC COMPATIBILITY
   Emissions and Immunity to EN 61326: Electrical Equipment for Measurement, Control and Laboratory use.

   Immunity to Industrial Locations:

Electrostatic discharge	EN 61000-4-2	Criterion A [2] 4 kV contact discharge 8 kV air discharge
Electromagnetic RF fields	EN 61000-4-3	Criterion A 10 V/m
Fast transients (burst)	EN 61000-4-4	Criterion A 2 kV power 2 kV signal
Surge	EN 61000-4-5	Criterion A 1kV L-L,2 kV L&N-E power
RF conducted interference	EN 61000-4-6	Criterion A 3 V/rms

   Emissions:

Emissions	EN 55011	Class A

   Notes:
   1. Criterion A: Normal operation within specified limits.
   2. This device was designed for installation in an enclosure. To avoid electrostatic discharge to the unit in environments with static levels above 4 kV precautions should be taken when the device is mounted outside an enclosure. When working in an enclosure (ex. making adjustments, setting jumpers etc.) typical anti-static precautions should be observed before touching the unit.
10. **WEIGHT**: 12.9oz (365.7g)

ORDERING INFORMATION

TYPE	MODEL NO.	DESCRIPTION	PART NUMBER
Master Module	CSMSTR[1]	Modular Controller Master, Comms, Ethernet	CSMSTRV2
		Modular Controller with multiple protocol converter, data logger, web server with Virtual HMI up to QVGA (320 x 240) size and expansion slot.	CSMSTRSX
		Modular Controller with multiple protocol converter, data logger, web server with Virtual HMI up to VGA (640 x 480) size and expansion slot with increased SDRAM.	CSMSTRGT
Communications Cables (10 feet)	CBL	RS232 Programming Cable	CBLPROG0
		USB Cable	CBLUSB00
		Communications Cables[1]	CBLxxxxx
Software	SFCRM2	Crimson 2.0 [2], Modular Controller Manual, and Download Cable	SFCRM2MC
Power Supply	PSDR	DIN Rail Mounted Power Supply	PSDRXXXX
Accessories	G3CF	64 MB CompactFlash Card [3]	G3CF064M
		256 MB CompactFlash Card [3]	G3CF256M
		512 MB CompactFlash Card [3]	G3CF512M
		Rail Stops (Qty 2)	RSRSTP00
		Replacement Base	CSBASE00
		Replacement Termination Plug	CSTERM00

[1] Visit www.redlion.net for a complete list of PID modules, data acquisition modules, communications drivers and cables.

The CSMSTRV2 was designed as a direct replacement for the original CSMSTRSE. This new model provides benefits such as support via Crimson 2.0 software that allows configuration files to be uploaded. To save programming time, files originally created in Crimson 1.0 (.cdb files) may be imported into Crimson 2.0.

[2] Use this part number to purchase Crimson on CD with a printed Modular Controller Manual, USB cable, and RS-232 cable. Otherwise, download free of charge from www.redlion.net.

[3] Industrial grade two million write cycles.

HARDWARE

INSTALLATION

DIN rail should be mounted horizontally so that the unit's ventilation holes are vertical in relation to cabinet orientation. A minimum clearance of 1 inch (25.4 mm) should be maintained above and below the unit in order to ensure proper thermal regulation.
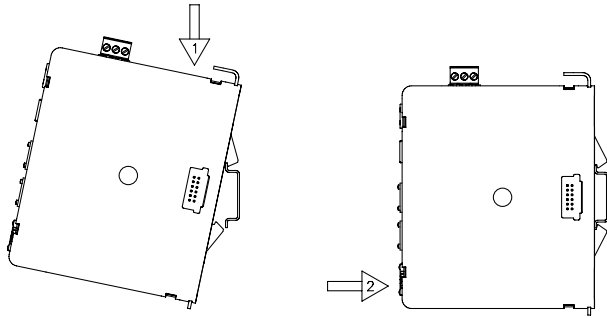
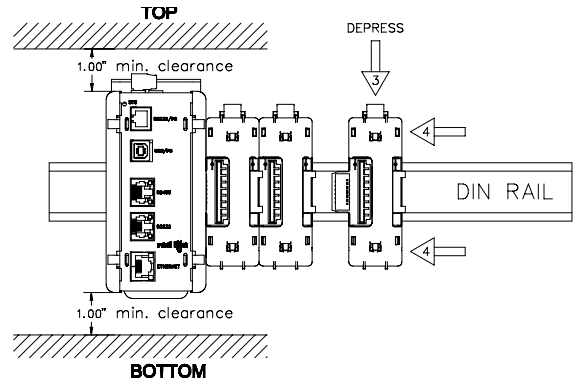**Figure 1 - Attach CSMSTR Master To DIN Rail**
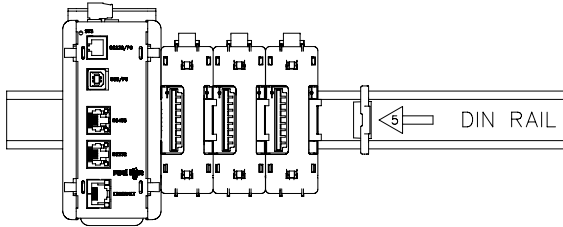
Figure 2 - Attach Slave Bases To DIN Rail

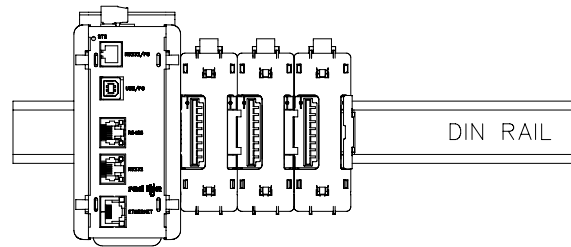**Figure 3 - Attach Termination Plug***
* Supplied with CSMSTR Master Module.

Figure 4 - Installation Complete

POWER SUPPLY REQUIREMENTS

It is very important that the power supply is mounted correctly if the unit is to operate reliably. Please take care to observe the following points:

– The power supply must be mounted close to the unit, with usually not more than 6 feet (1.8 m) of cable between the supply and the master. Ideally, the shortest length possible should be used.

– The wire used to connect the master's power supply should be at least 22-gage wire. If a longer cable run is used, a heavier gage wire should be used. The routing of the cable should be kept away from large contactors, inverters, and other devices which may generate significant electrical noise.

– A power supply with a Class 2 or SELV rating is to be used. A Class 2 or SELV power supply provides isolation to accessible circuits from hazardous voltage levels generated by a mains power supply due to single faults. SELV is an acronym for "safety extra-low voltage." Safety extra-low voltage circuits shall exhibit voltages safe to touch both under normal operating conditions and after a single fault, such as a breakdown of a layer of basic insulation or after the failure of a single component has occurred.

Visit www.redlion.net for a complete list of our PSDR Series of Class 2 power supplies.

EMC INSTALLATION GUIDELINES

Although Red Lion Controls Products are designed with a high degree of immunity to Electromagnetic Interference (EMI), proper installation and wiring methods must be followed to ensure compatibility in each application. The type of the electrical noise, source or coupling method into a unit may be different for various installations. Cable length, routing, and shield termination are very important and can mean the difference between a successful or troublesome installation. Listed are some EMI guidelines for a successful installation in an industrial environment.

1. To reduce the chance of noise spikes entering the unit via the power lines, connections should be made to a clean source. Connecting to circuits that also power loads such as contactors, relays, motors, solenoids etc. should be avoided.
2. The unit should be mounted in a metal enclosure, which is properly connected to protective earth.
3. Use shielded (screened) cables for all Signal and Control inputs. The shield (screen) pigtail connection should be made as short as possible. The connection point for the shield depends somewhat upon the application. Listed below are the recommended methods of connecting the shield, in order of their effectiveness.
   a. Connect the shield to earth ground (protective earth) at one end where the unit is mounted.
   b. Connect the shield to earth ground at both ends of the cable, usually when the noise source frequency is over 1 MHz.
   c. Connect the shield to common of the master and leave the other end of the shield unconnected and insulated from earth ground.

4. Never run Signal or Control cables in the same conduit or raceway with AC power lines, conductors feeding motors, solenoids, SCR controls, and heaters, etc. The cables should be run through metal conduit that is properly grounded. This is especially useful in applications where cable runs are long and portable two-way radios are used in close proximity or if the installation is near a commercial radio transmitter. Also, Signal or Control cables within an enclosure should be routed as far away as possible from contactors, control relays, transformers, and other noisy components.
5. Long cable runs are more susceptible to EMI pickup than short cable runs. Therefore, keep cable runs as short as possible.
6. In extremely high EMI environments, the use of external EMI suppression devices is effective. The following EMI suppression devices (or equivalent) are recommended:
   Ferrite Suppression Cores for signal and control cables:
     Fair-Rite part number 0443167251 (RLC part number FCOR0000)
     TDK part number ZCAT3035-1330A
     Steward part number 28B2029-0A0
   Line Filters for input power cables:
     Schaffner part number FN610-1/07 (RLC part number LFIL0000)
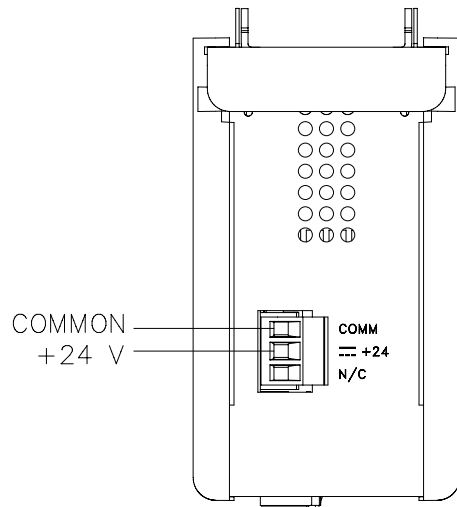   Schaffner part number FN670-1.8/07
     Corcom part number 1 VR3

Visit RLC's web site at www.redlion.net for more information on EMI guidelines, Safety and CE issues as they relate to Red Lion Controls products.
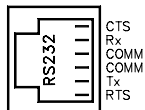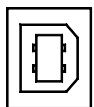
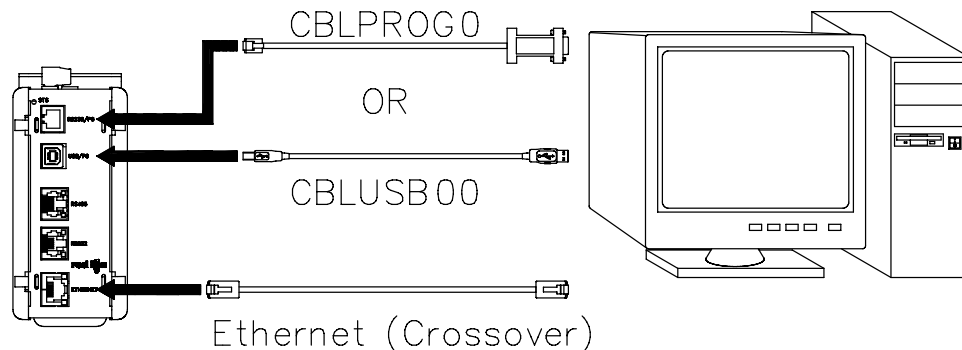# WIRING
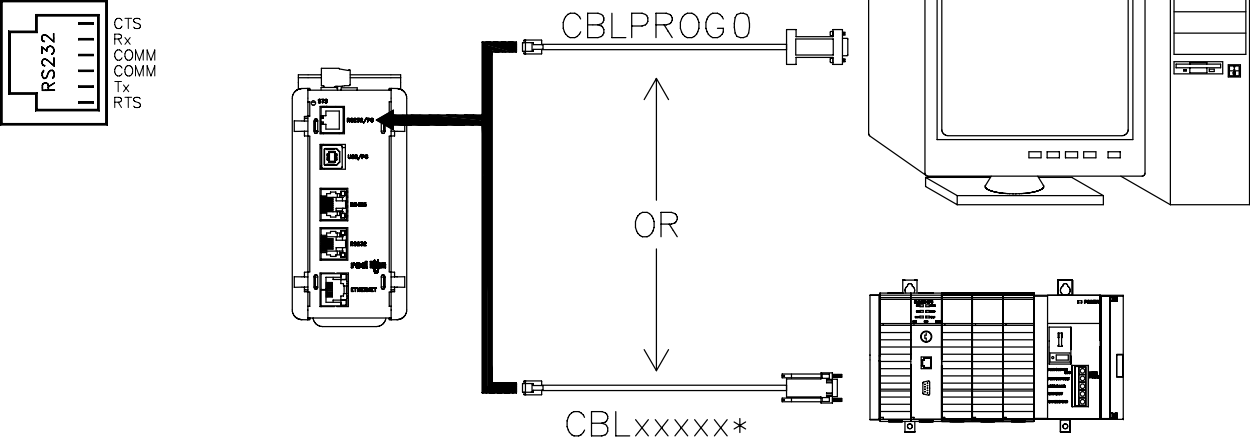
POWER CONNECTION

PROGRAMMING PORTS

RS232/PG

USB/PG

ETHERNET

4

COMMUNICATION PORTS

RS232/PG

CTS
Rx
COMM
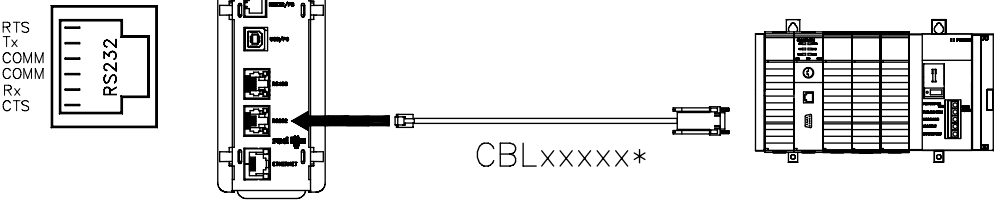COMM
Tx
RTS

RS232

CBLPROG0

OR
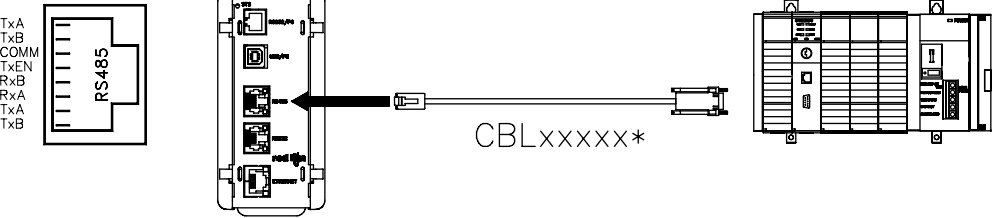
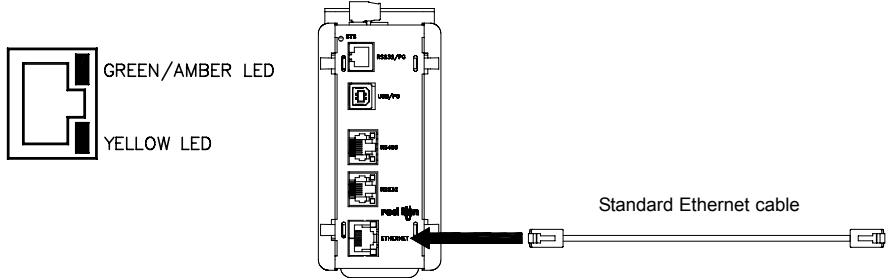CBLxxxxx*

RS232

RTS
Tx
COMM
COMM
Rx
CTS

RS232

CBLxxxxx*

* Use appropriate communications cable. See Ordering Information for descriptions of the available cables.

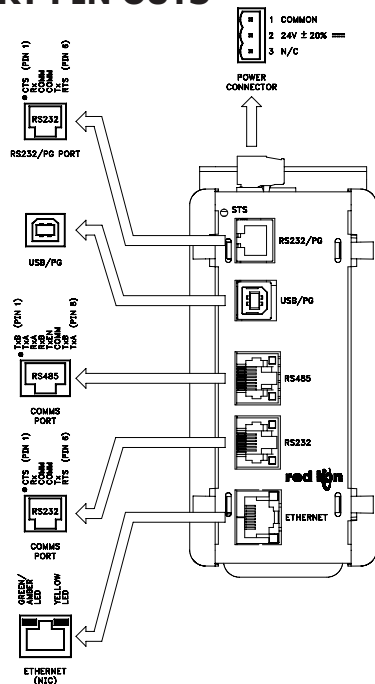**WARNING:** Do **NOT** use a standard DH-485 cable to connect this port to Allen Bradley equipment.

RS485

TxA
TxB
COMM
TxEN
RxB
RxA
TxA
TxB

RS485

CBLxxxxx*

PORT 3 - ETHERNET CONNECTION

GREEN/AMBER LED

YELLOW LED

Standard Ethernet cable

MASTER PORT PIN OUTS

TROUBLESHOOTING

If for any reason you have trouble operating, connecting, or simply have questions concerning your new Master, contact Red Lion's technical support. For contact information, refer to the back page of this bulletin for phone and fax numbers.

EMAIL: techsupport@redlion.net
Web Site: http://www.redlion.net

COMMUNICATING WITH THE MASTER

CONFIGURING A MASTER

The Master is configured using Crimson 2.0 software. Crimson 2.0 is available as a free download from Red Lion's website, or it can be ordered on CD. Updates to Crimson 2.0 for new features and drivers are posted on the website as they become available. By configuring the Master using the latest version of Crimson 2.0, you are assured that your unit has the most up to date feature set. Crimson 2.0 software can configure the Master through the RS232/PG port, USB/PG port, or Ethernet port. The USB/PG port is connected using a standard USB cable with a Type B connector.

The driver needed to use the USB port will be installed with Crimson 2.0. The RS232/PG port uses a programming cable made by Red Lion to connect to the DB9 COM port of your computer. If making your own cable, refer to the "Master Port Pin Outs" for wiring information.

CABLES AND DRIVERS

Red Lion has a wide range of cables and drivers for use with many different communication types. A list of these drivers and cables along with pin outs is available from Red Lion's website. New cables and drivers are added on a regular basis. If making your own cable, refer to the "Master Port Pin Outs" for wiring information.

Note: The USB port is for system set-up and diagnostics and is not intended for permanent connection.

ETHERNET COMMUNICATIONS

Ethernet communications can be established at either 10 BASE-T or 100 BASE-TX. The Master's RJ45 jack is wired as a NIC (Network Interface Card). For example, when wiring to a hub or switch use a straight-through cable, but when connecting to another NIC use a crossover cable.
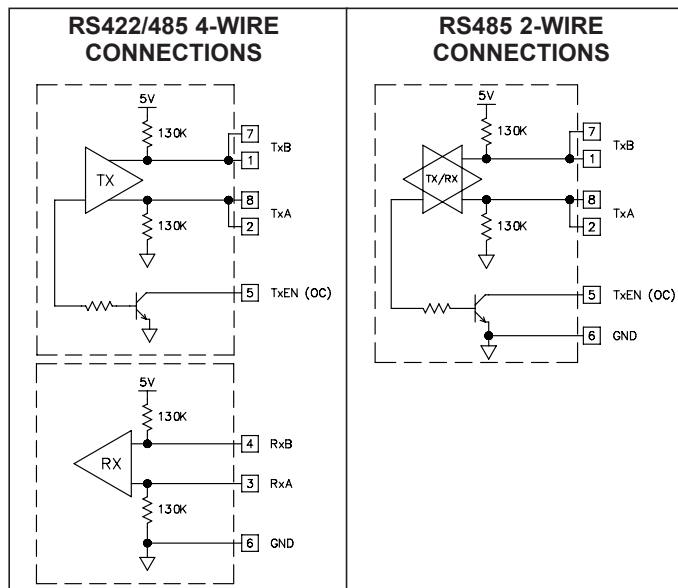
The Crimson 2.0 manual contains additional information on Ethernet communications.

RS232 PORTS

The Master has two RS232 ports. There is the RS232/PG port and the COMMS port. Although only one of these ports can be used for programming, both ports can be used for communications with a PLC. The RS232/PG port can be used for either master or slave protocols.

RS422/485 PORT

The Master has one RS422/485 port. This port can be configured to act as either RS422 or RS485.

Note: All Red Lion devices connect A to A and B to B, except for Paradigm devices. Refer to www.redlion.net for additional information.

DH485 COMMUNICATIONS

The Master's RS422/485 COMMS port can also be used for Allen Bradley DH485 communications.

WARNING: DO NOT use a standard DH485 cable to connect this port to Allen Bradley equipment. A cable and wiring diagram are available from Red Lion.

LEDS

STS – STATUS LED

The green Status LED provides information regarding the state of the Master, as well as the rest of the system. This includes indication of the various stages of the start-up routine (power-up), and any errors that may occur.

Startup Routine

	INDICATION
Rapidly Flashing	Master is currently running the boot loader and/or being flash upgraded by Crimson.
Steady	Master is operating properly.

Error States

LED	INDICATION
1 blink, pause, repeat	One or more slave modules are missing from the system. Master and installed modules will perform normally in this state.
2 blinks, pause, repeat	Missing configuration, or configuration being updated by Crimson.
3 blinks, pause, repeat	Quantity of module bases does not match configuration file. Master will not communicate with the modules until the error is corrected.
4 blinks, pause, repeat	Termination plug not installed, or one or more bases are malfunctioning. Master will not communicate with the modules until the plug is reinstalled, and power is cycled.

ETHERNET LEDS

LED	INDICATION
YELLOW (Solid)	Link Established
YELLOW (Flashing)	Network Activity
GREEN	10 BASE-T Communications
AMBER	100 BASE-TX Communications

USER COMMUNICATION PORTS - TX/RX LEDS

LED	INDICATION
GREEN	Transmitting
RED	Receiving

Note: LEDs are not available on the Programming Port: RS232/PG.

LIMITED WARRANTY

The Company warrants the products it manufactures against defects in materials and workmanship for a period limited to two years from the date of shipment, provided the products have been stored, handled, installed, and used under proper conditions. The Company's liability under this limited warranty shall extend only to the repair or replacement of a defective product, at The Company's option. The Company disclaims all liability for any affirmation, promise or representation with respect to the products.

The customer agrees to hold Red Lion Controls harmless from, defend, and indemnify RLC against damages, claims, and expenses arising out of subsequent sales of RLC products or products containing components manufactured by RLC and based upon personal injuries, deaths, property damage, lost profits, and other matters which Buyer, its employees, or sub-contractors are or may be to any extent liable, including without limitation penalties imposed by the Consumer Product Safety Act (P.L. 92-573) and liability imposed upon any person pursuant to the Magnuson-Moss Warranty Act (P.L. 93-637), as now in effect or as amended hereafter.

No warranties expressed or implied are created with respect to The Company's products except those expressly contained herein. The Customer acknowledges the disclaimers and limitations contained herein and relies on no other warranties or affirmations.

red lion

Tel +1 (717) 767-6511
Fax +1 (717) 764-0839
www.redlion.net

MODEL CSPID – MODULAR CONTROLLER SERIES PID MODULES

- *DEDICATED SINGLE AND DUAL PID MODULES FOR THE MODULAR CONTROLLER SERIES*
- *HOT-SWAPPABLE REPLACEMENT REDUCES DOWNTIME*
- *AUTO ADDRESSING MINIMIZES CONFIGURATION TIME*
- *FULLY ISOLATED DESIGN PROVIDES RELIABLE OPERATION*
- *PID CONTROL WITH REDUCED OVERSHOOT*
- *UNIVERSAL INPUTS ACCEPT TC, RTD, 0-10 V and 0/4-20 mA SIGNALS*
- *ON DEMAND AUTO-TUNING OF PID SETTINGS*
- *DC ANALOG OUTPUT (OPTIONAL, CSPID1 ONLY)*
- *HEATER CURRENT INPUT (OPTIONAL) ENSURES DETECTION OF HEATER CIRCUIT FAILURE*
- *WINDOWS® CONFIGURATION SOFTWARE*

C UL US LISTED
IND. CONT. EQ.
34AD

C E

GENERAL DESCRIPTION

The Model CSPID series modules are full featured PID controllers designed for use with the Modular Controller Series. The CSPID1 is a single loop controller, while the CSPID2 is a dual loop controller. The design of the system provides a true modular PID control platform for multi-zone control applications. The modules can accept a wide range of thermocouple, RTD, 0-10 V, 0/4-20 mA signals. With multiple discrete outputs, plus an optional analog output (CSPID1 only), the CSPID modules can perform virtually any combination of time-proportioning or linear control for heat, cool, or heat/cool applications. The discrete outputs may also be assigned to one of seven internal soft alarms. The CSPID1's optional linear output can be assigned to transmit virtually any internal variable.

The CSPID modules connect and communicate via a backplane connection to the CSMSTR Modular Controller Series Master. The CSMSTR, equipped with serial ports as well as an Ethernet port, allows the system to share data with PCs, PLCs, and SCADA systems. The Master supports any combination of up to 16 CS Series modules.

The CSPID modules are available with various discrete output combinations, including relays, open drain MOSFETs, and triac outputs. For applications requiring large loads to be controlled, several DIN rail mount relays are available.

The modules can operate in On/Off, P, PI, or PID control mode, and use an on-demand Auto-Tune that establishes the tuning constants. The PID constants may be fine-tuned through the serial or Ethernet interface. The modules employ a unique overshoot suppression feature, which allows the quickest response without excessive overshoot. The modules can also be operated in manual mode, providing the operator with direct control of the output.

Internal power management circuits allow the modules to be replaced while power is applied, which reduces downtime in the event of a relay failure. All configuration information is stored locally within each module, as well as in the Master, so replacement modules do not need to be configured.

The Modular Controller Series' high density packaging and DIN rail mounting saves time and panel space. The backplane connection provides power and communication to the module and snaps easily onto standard top hat (T) profile DIN rail.

CONFIGURATION

The Modular Controller Series is configured with Windows® compatible Crimson™ software. The software is an easy to use, graphical interface which provides a means of communication configuration, as well as commissioning and calibration of new systems.
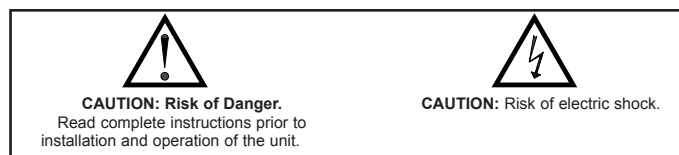
ALARMS

Each loop within the modules has seven internal "soft" alarms, which can be assigned to trigger any output. This includes four process alarms, two heater current, and one input fault alarm.

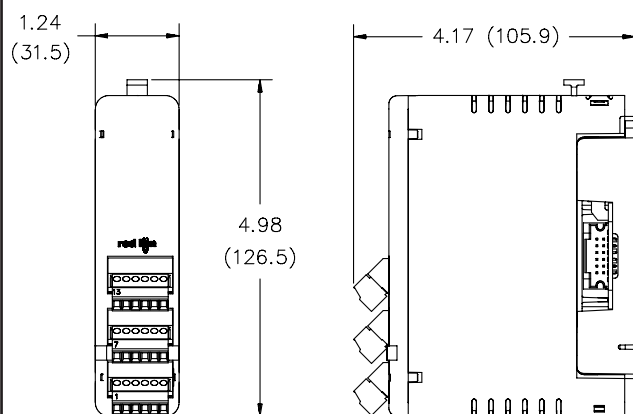## ANALOG OUTPUT OPTION (CSPID1 ONLY)

The optional DC Analog Output (10 V or 20 mA) can be independently configured and scaled for control or re-transmission purposes.

HEATER CURRENT MONITOR OPTION

The optional Heater Current Monitor input is useful for early warning of heater degradation, or heater circuit failure. The input connects to a current transformer with an output of 100 mA AC to ensure that proper heater current is present when the control output is on, and that little or no current is present when the output is off. This option provides immediate warning of a circuit short or open, instead of waiting for a high or low temperature shutdown alarm.

⚠ **CAUTION: Risk of Danger.**
Read complete instructions prior to installation and operation of the unit.

⚠ **CAUTION:** Risk of electric shock.

DIMENSIONS In inches (mm)

1.24 (31.5)

4.17 (105.9)

4.98 (126.5)

SAFETY SUMMARY

All safety related regulations, local codes and instructions that appear in the manual or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Do not use the controller to directly command motors, valves, or other actuators not equipped with safeguards. To do so can be potentially harmful to persons or equipment in the event of a fault to the controller. An independent and redundant temperature limit indicator with alarm outputs is strongly recommended.

SPECIFICATIONS

1. **POWER**: Derived from system backplane. (CSPID1 draws 150 mA max. load on power input of MASTER, CSPID2 draws 125 mA max). Modules may be hot-swapped (Replaced while powered up).

2. **LEDs***:
   STS - Status LED shows module condition
   OP1, OP2, OP3, OP4 - Indicate status of outputs 1, 2, 3, and 4
   ALM, or **AL1** and **AL2** - Alarm LEDs are lit during any internal alarm condition
   * Default configuration.

3. **MEMORY**: Non-volatile memory retains all programmable parameters. MASTER also stores the parameters in order to reprogram modules that are replaced.

4. **INPUT**:
   GENERAL:
   Sample Time: 67 msec (15 Hz)
   Common Mode Rejection: >110 dB, 50/60 Hz
   Normal Mode Rejection: >40 dB, 50/60 Hz
   Temperature Coefficient: 0.01%/°C
   Step Response Time: 200 msec typ., 250 msec max
   THERMOCOUPLE INPUTS:
   Types: T, E, J, K, R, S, B, N, C
   Input Impedance: 20 M Ω
   Lead Resistance Effect: 0.25 µV/Ω
   Cold Junction Compensation: Less than ±1°C typical (±1.5°C max) over 0 to 50 °C ambient temperature
   Resolution: 0.1°

TYPE	MEASUREMENT RANGE	WIRE COLOR	
		ANSI	BS 1843
T	-200 to +400°C -328 to +752°F	(+) Blue (-) Red	(+) White (-) Blue
E	-200 to +730°C -328 to +1346°F	(+) Violet (-) Red	(+) Brown (-) Blue
J	-200 to +760°C -328 to +1400°F	(+) White (-) Red	(+) Yellow (-) Blue
K	-200 to +1250°C -328 to +2282°F	(+) Yellow (-) Red	(+) Brown (-) Blue
R	0 to +1768°C +32 to +3214°F	No Standard	(+) White (-) Blue
S	0 to +1768°C +32 to +3214°F	No Standard	(+) White (-) Blue
B	+149 to +1820°C +300 to +3308°F	No Standard	No Standard
N	-200 to +1300°C -328 to +2372°F	(+) Orange (-) Red	(+) Orange (-) Blue
C W5/W6	0 to +2315°C +32 to +4199°F	No Standard	No Standard
mV	-5 mV to 56 mV	N/A	N/A

RTD INPUTS:
Type: 2 or 3 wire
Excitation: 150 µA
Lead Resistance: 15 Ω Max
Resolution: 1 or 0.1°

TYPE	INPUT TYPE	RANGE
385	100 Ω platinum, Alpha = .00385	-200 to +600°C -328 to +1100°F
392	100 Ω platinum, Alpha = .003919	-200 to +600°C -328 to +1100°F
672	120 Ω nickel, Alpha = .00672	-80 to +215°C -112 to +419°F

PROCESS INPUT:

INPUT RANGE	ACCURACY (18 TO 28 °C)	IMPEDANCE	MAX CONTINUOUS OVERLOAD	RESOLUTION
10 V	0.1% span	1 M Ohm	50 V	16 bit
20 mA	0.1% span	10 Ohm	100 mA	16 bit

5. **TEMPERATURE INDICATION ACCURACY**: ± (0.3% of span, +1°C). Includes NIST conformity, cold junction effect, A/D conversion errors, temperature coefficient and linearization conformity at 23 °C after 20 minute warm up.

6. **ISOLATION LEVEL**: 500 Vrms @ 50/60 Hz for 1 minute between the following:
   OP1
   OP2
   OP3
   OP4
   Linear Output (CSPID1 only)
   Signal Inputs and HCM
   CS Master Power Supply Input

7. **COMMUNICATIONS**: Provided by the CS Master

8. **A/D CONVERTER**: 16 bit resolution

9. **DISCRETE OUTPUTS**:
   CSPID1: Outputs 1 and 2 available as Solid State NFET, Form A relay or Triac. Output 3 is a Form C relay.
   CSPID2: Outputs 1 through 4 available as Form A relay, Solid State NFET, or Triac.
   Solid State Output:
   Type: Switched DC, N Channel open drain MOSFET
   Current Rating: 1 A max
   VDS ON: 0.3 V @ 1 A
   VDS MAX: 30 VDC
   Offstate Leakage Current: 0.5 mA max
   Form A Relay Output:
   Type: N.O.
   Current Rating: 3 Amps @ 125 VAC
   1/10 HP @ 125 VAC
   Life Expectancy: 200,000 cycles at maximum load rating. (Decreasing load, increasing cycle time, and use of surge suppression such as RC snubbers increases life expectancy.)
   Form C Relay Output:
   Type: SPDT
   Current Rating: 5 Amps @ 125 VAC or 28 VDC (resistive load)
   1/8 HP @ 125 VAC
   Life Expectancy: 100,000 cycles at maximum load rating. (Decreasing load, increasing cycle time, and use of surge suppression such as RC snubbers increases life expectancy.)
   Triac: (CSPID1TA only)
   Type: Optically isolated, zero-crossing detection
   Rating: 120 VAC, Min: 20 VAC
   Max Load Current: 1.0 A across Operating Temperature Range
   Min Load Current: 5 mA
   Offstate Leakage Current: 1 mA Max
   Operating Frequency: 20 to 400 Hz
   Protection: Internal Transient Suppression, Fused
   Triac: (CSPID2T0 and CSPID2TM only)
   Type: Optically isolated, zero-crossing detection
   Rating: 120 VAC, Min: 20 VAC
   Max Load Current: 0.5A @ 25°C, 0.4A @ 50°C
   Min Load Current: 5 mA
   Offstate Leakage Current: 1 mA Max
   Operating Frequency: 20 to 500 Hz
   Protection: Internal Transient Suppression, Fused

10. **CONTROL MODES**:
    Control: On/Off, P, PI, or PID
    Output: Time proportioning or linear (CSPID1 only)
    Cycle Time: Programmable from 0.0 to 60.0 sec
    Auto-Tune: When selected, sets proportional band, integral time, derivative time values, and output dampening time
    Probe Break Action: Programmable response
    Sensor Fail Response: Upscale

11. **ALARMS**:
   Modes:
      Manual
      Absolute High Acting
      Absolute Low Acting
      Deviation High Acting
      Deviation Low Acting
      Inside Band Acting
      Outside Band Acting
   Reset Action: Programmable; automatic or latched
   Standby Mode: Programmable; enable or disable
   Hysteresis: Programmable
   Sensor Fail Response: Upscale

12. **ANALOG DC OUTPUT** (optional, CSPID1 only):
   Selectable/programmable for 0-10 VDC, 0-20 mA, or 4-20 mA
   Resolution:
      Voltage: 500 µV
      Current: 1 µA
   Accuracy:
      0.1% of full scale (18 to 28°C)
      0.2% of full scale (0 to 50°C)
   Update Time: 0.0 to 60.0 sec
   Compliance (for current output only): 500 Ω max.
   Minimum load (voltage output only): 10 KΩ min.
   Outputs are independently jumper selectable for either 10 V or 20 mA. The output range may be field calibrated to yield approximate 10% overrange and a small underrange (negative) signal.

13. **HEATER CURRENT MONITOR INPUT** (optional):
   Type: Single phase, full wave monitoring of load currents
   Input: 100 mA max. input for use with external current transformers
   Input Resistance: 5 Ω
   Accuracy: ±3.0% full scale, 5 to 100% of range
   Frequency: 50 to 400 Hz
   Minimum output on time for break alarm: 350 msec

14. **ENVIRONMENTAL CONDITIONS**:
   Operating Temperature Range: 0 to +50°C
   Storage Temperature Range: -40 to +85°C
   Operating and Storage Humidity: 85% max relative humidity, non-condensing, from 0 to +50°C
   Vibration According to IEC 68-2-6: 10 to 150 Hz, 0.075 mm amplitude in X, Y, Z direction 1 g.
   Shock According to IEC 68-2-27: Operational 25 g (10g relay), 11 msec in 3 directions.

Altitude: Up to 2000 meters

15. **CERTIFICATIONS AND COMPLIANCES**:
   SAFETY
   UL Listed, File # E302106, UL508, CSA C22.2 No. 14-M05
      LISTED by Und. Lab. Inc. to U.S. and Canadian safety standards
   IEC 61010-1, EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1.
   ELECTROMAGNETIC COMPATIBILITY
   Emissions and Immunity to EN 61326: Electrical Equipment for

Immunity to Industrial Locations:

Electrostatic discharge	EN 61000-4-2	Criterion A, Criterion B[4] 4 kV contact discharge 8 kV air discharge
Electromagnetic RF fields	EN 61000-4-3	Criterion B 10 V/m
Fast transients (burst)	EN 61000-4-4	Criterion A 2 kV power 1 kV signal
Surge	EN 61000-4-5	Criterion A 1 kV L-L, 2 kV L&N-E power
RF conducted interference	EN 61000-4-6	Criterion B 3 V/rms

Emissions:

Emissions	EN 55011	Class A

Measurement, Control and Laboratory use.

Notes:
1. Criterion A: Normal operation within specified limits.
2. Criterion B: Temporary loss of performance from which the unit self-recovers.
3. Power supplied from backplane via Master Module.
4. CSPID2

16. **CONSTRUCTION**: Case body is burgundy high impact plastic. Installation Category I, Pollution Degree 2.
17. **CONNECTIONS**: Removable wire clamp screw terminal blocks.
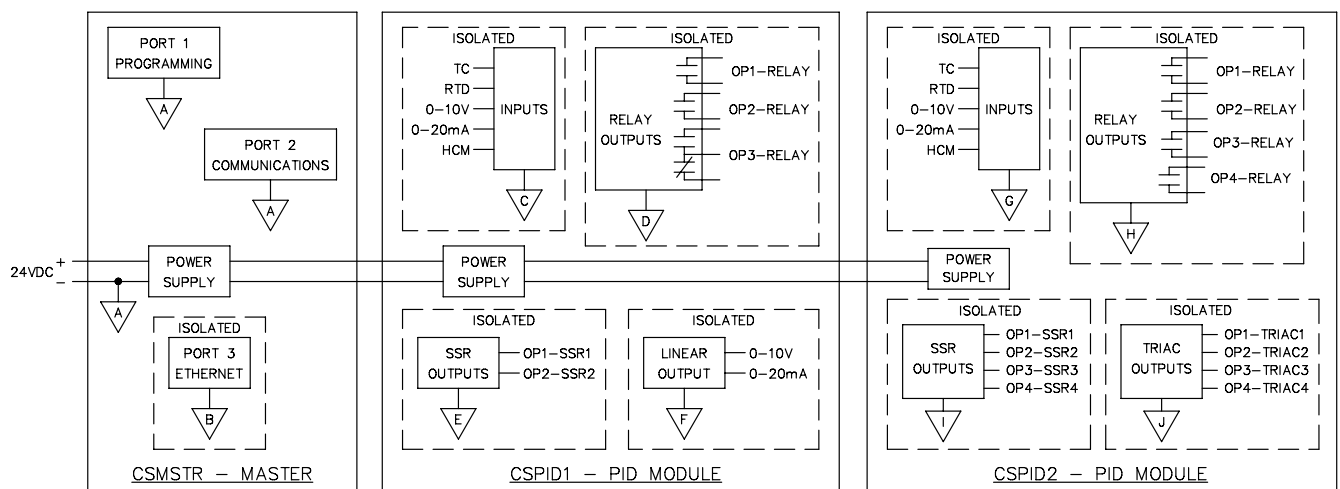   Wire Gage: 28-16 AWG terminal gage wire
   Torque: 1.96-2.23 inch/lbs (0.22-0.25 N-m)
18. **MOUNTING**: Snaps on to standard DIN style top hat (T) profile mounting rails according to EN50022 -35 x 7.5 and -35 x 15.
19. **WEIGHT**: CSPID1: 7 oz (198.4 g)
             CSPID2: 7 oz (198.4 g)

BLOCK DIAGRAM

CSMSTR — MASTER   CSPID1 — PID MODULE   CSPID2 — PID MODULE

EMC INSTALLATION GUIDELINES

Although Red Lion Controls Products are designed with a high degree of immunity to Electromagnetic Interference (EMI), proper installation and wiring methods must be followed to ensure compatibility in each application. The type of the electrical noise, source or coupling method into a unit may be different for various installations. Cable length, routing, and shield termination are very important and can mean the difference between a successful or troublesome installation. Listed are some EMI guidelines for a successful installation in an industrial environment.

1. A unit should be mounted in a metal enclosure, which is properly connected to protective earth.
   a. The mounting clip that connects to the DIN rail should have the DIN rail connected to protective earth.
2. Use shielded (screened) cables for all Signal and Control inputs. The shield (screen) pigtail connection should be made as short as possible. The connection point for the shield depends somewhat upon the application. Listed below are the recommended methods of connecting the shield, in order of their effectiveness.
   a. Connect the shield to earth ground (protective earth) at one end where the unit is mounted.
   b. Connect the shield to earth ground at both ends of the cable, usually when the noise source frequency is over 1 MHz.
   c. Connect the shield to common of the module and leave the other end of the shield unconnected and insulated from earth ground.
3. Never run Signal or Control cables in the same conduit or raceway with AC power lines, conductors feeding motors, solenoids, SCR controls, and heaters, etc. The cables should be run through metal conduit that is properly grounded. This is especially useful in applications where cable runs are long and portable two-way radios are used in close proximity or if the installation is near a commercial radio transmitter. Also, Signal or Control cables within an enclosure should be routed as far away as possible from contactors, control relays, transformers, and other noisy components.
4. Long cable runs are more susceptible to EMI pickup than short cable runs. Therefore, keep cable runs as short as possible.

5. In extremely high EMI environments, the use of external EMI suppression devices such as Ferrite Suppression Cores for signal and control cables is effective. The following EMI suppression devices (or equivalent) are recommended:
   Fair-Rite part number 0443167251 (RLC part number FCOR0000)
   TDK part number ZCAT3035-1330A
   Steward part number 28B2029-0A0
6. To protect relay contacts that control inductive loads and to minimize radiated and conducted noise (EMI), some type of contact protection network is normally installed across the load, the contacts or both. The most effective location is across the load.
   a. Using a snubber, which is a resistor-capacitor (RC) network or metal oxide varistor (MOV) across an AC inductive load is very effective at reducing EMI and increasing relay contact life.
   b. If a DC inductive load (such as a DC relay coil) is controlled by a transistor switch, care must be taken not to exceed the breakdown voltage of the transistor when the load is switched. One of the most effective ways is to place a diode across the inductive load. Most RLC products with solid state outputs have internal zener diode protection. However external diode protection at the load is always a good design practice to limit EMI. Although the use of a snubber or varistor could be used.
      RLC part numbers: Snubber SNUB0000
                         Varistor ILS11500 or ILS23000
   Note: Reference manufacturer's instructions when installing any EMI suppression device.
7. Also care should be taken when connecting input and output devices to the instrument. When a separate input and output common is provided, they should not be mixed. Therefore a sensor common should NOT be connected to an output common. This would cause EMI on the sensitive input common, which could effect the instruments, operation.
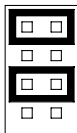
Visit RLC's web site at www.redlion.net for more information on EMI guidelines, Safety and CE issues as they relate to Red Lion Controls products.
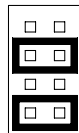

HARDWARE

CSPID1 ONLY
ANALOG OUTPUT OPTION

Select either Voltage or Current output by placing the output jumpers in the appropriate location. The output jumpers are located on the side of the CSPID1 module.
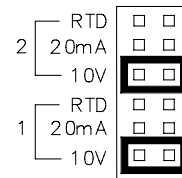

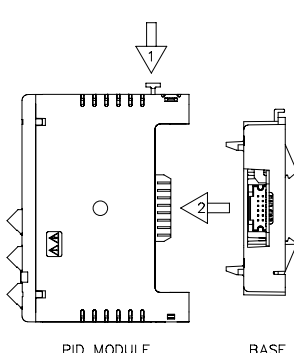**Voltage**   **Current**

CSPID2 ONLY
INPUT JUMPERS

Select the desired input type for each channel by positioning the jumper appropriately. For thermocouple inputs, the jumper position can be ignored.
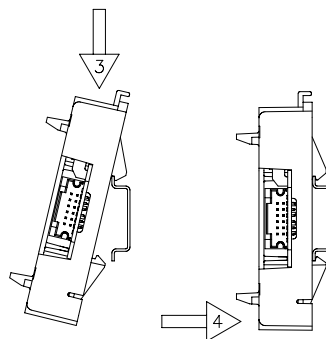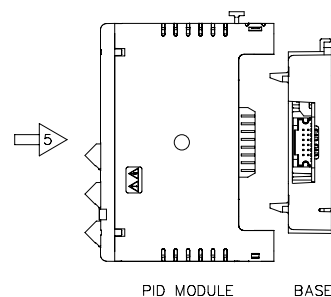

INSTALLATION

SEPARATE BASE FROM MODULE

PID MODULE   BASE

ATTACH THE MODULE BASE TO THE DIN RAIL

## ATTACH MODULE TO BASE

PID MODULE   BASE

4

# WIRING

WIRING CONNECTIONS

All conductors should meet voltage and current ratings for each terminal. Also, cabling should conform to appropriate standards of good installation, local codes and regulations. When wiring the module, use the numbers on the label to identify the position number with the proper function. Strip the wire, leaving approximately 1/4" (6 mm) of bare wire exposed. Insert the wire into the terminal, and tighten.
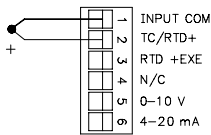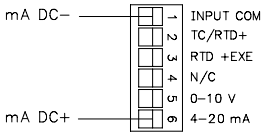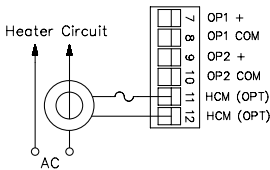

Terminals 13 to 18
Terminals 7 to 12
Terminals 1 to 6
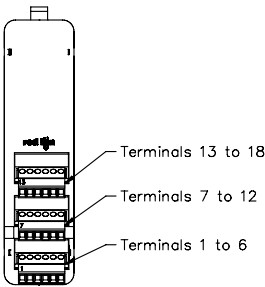
CSPID1 INPUT CONNECTIONS

RTD
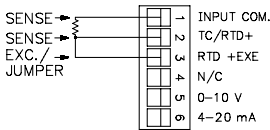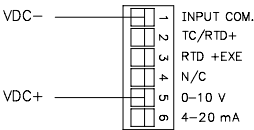
Voltage

Thermocouple and Millivolt

Current

Heater Current Monitor

CSPID2 INPUT CONNECTIONS

RTD
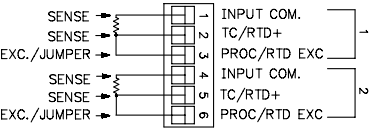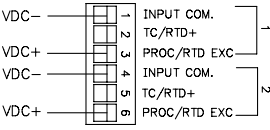
Voltage
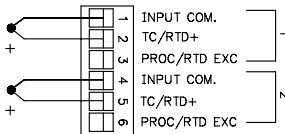
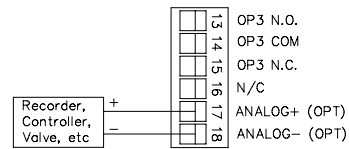**Thermocouple and Millivolt**
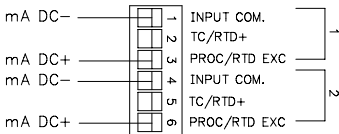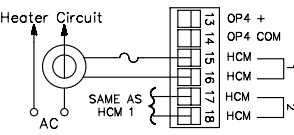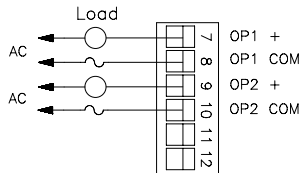
Current

Heater Current Monitor
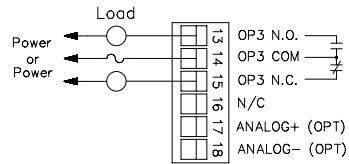
CSPID1 OUTPUT CONNECTIONS
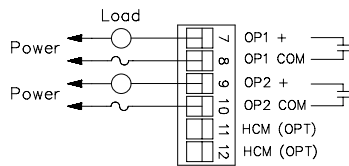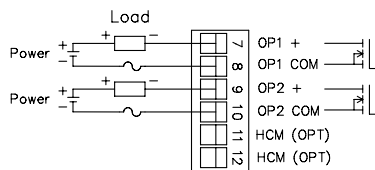
Outputs 1 and 2 - Relay Version

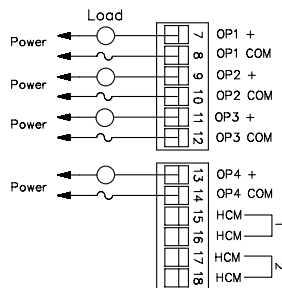**Analog Output**

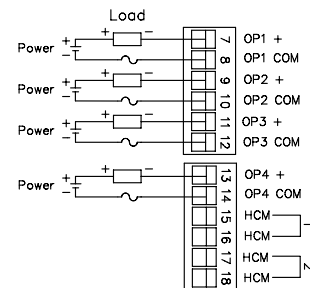**Outputs 1 and 2 - Triac Version**
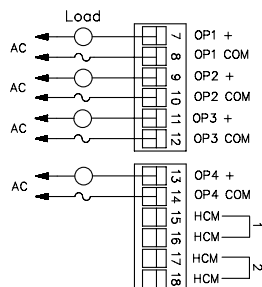
Output 3

Outputs 1 and 2 - Solid State Version

CSPID2 OUTPUT CONNECTIONS

Outputs 1- 4 - Relay Version

Outputs 1- 4 - Solid State Version

Outputs 1- 4 - Triac Version

6

LEDS

STS – STATUS LED

The Status LED is a dual color LED that provides information regarding the state of the module. This includes indication of the various stages of the start-up routine (power-up), as well as any errors that may occur.

Startup Routine

Rapidly Flashing Red	Module is currently running the boot loader and/or being flash upgraded by Crimson. This occurs for four seconds during a power up.
Steady Red	Module switching to configuration.
Green	Module performing normally.

FIRMWARE UPGRADE

The module's firmware is stored in flash memory to prevent software/hardware conflicts, and so that software features may be added in the future.

During a download, Crimson compares its own library of firmware files with those stored in the Master module. If they do not match, Crimson will download the necessary files. The Master then checks to make sure that the I/O modules contain the same firmware. If they contain a different revision, the Master will automatically copy those files into the module's flash memory. During this process, the module LEDs will flash rapidly, starting with the top row, and progressing through the remaining rows until the process is complete.

Error States

Solid Red	Module not controlling, and not communicating.
Green/Pulsing Red	Module is controlling properly, but has lost communication with the Master.

OP1, OP2, OP3, OP4* – OUTPUT STATUS LED

The OP1, OP2, OP3, and OP4* LEDs are factory configured to indicate the status of the outputs. The LEDs turn on when the output is active.

These LEDs may be remapped to various other module properties.

*CSPID2 only

ALM OR AL1 & AL2 – ALARM LED

The Alarm LEDs are factory configured to indicate the presence of an alarm. Whenever one of the seven alarms is active, the LED turns on.

These LEDs may be remapped to various other module properties.

CONFIGURATION

Programming is done via Crimson, a Windows® compatible configuration interface. Please see the Crimson manual for more information.

ORDERING INFORMATION

TYPE	MODEL NO.	DESCRIPTION	PART NUMBER
Master Module	CSMSTR	Modular Controller Master, Multi Comms ports and Ethernet	CSMSTRV2
		Modular Controller Master with multiple protocol converter, Ethernet and expansion slot	CSMSTRLE
		Modular Controller Master with multiple protocol converter, data logger, web server with Virtual HMI up to QVGA (320 x 240) size and expansion slot.	CSMSTRSX
		Modular Controller Master with multiple protocol converter, data logger, web server with Virtual HMI up to VGA (640 x 480) size and expansion slot with increased SDRAM	CSMSTRGT
PID Control Modules	CSPID1[1]	Single Loop Module, Relay Outputs	CSPID1R0
		Single Loop Module, Relay Outputs, Analog Output	CSPID1RA
		Single Loop Module, Relay Outputs, Heater Current Input	CSPID1RM
		Single Loop Module, Solid State Outputs	CSPID1S0
		Single Loop Module, Solid State Outputs, Analog Output	CSPID1SA
		Single Loop Module, Solid State Outputs, Heater Current Input	CSPID1SM
		Single Loop Module, Triac Outputs, Analog Output	CSPID1TA
	CSPID2	Dual Loop Module, Relay Outputs	CSPID2R0
		Dual Loop Module, Relay Outputs, Heater Current Input	CSPID2RM
		Dual Loop Module, Solid State Outputs	CSPID2S0
		Dual Loop Module, Solid State Outputs, Heater Current Input	CSPID2SM
		Dual Loop Module, Triac Outputs	CSPID2T0
		Dual Loop Module, Triac Outputs, Heater Current Input	CSPID2TM
Communications Cables (10 feet)	CBL	Programming Cable for CS, G3, & Paradigm Series	CBLPROG0
		Communications Cables[1]	CBLxxxxx
Software		Crimson Programming Software[2]	SFCRM
		Crimson Programming Software, Manual, and Download Cable	SFCRK
Accessories		Rail Stops (Qty 2)	RSRSTP00
		Replacement Base	CSBASE00
		Replacement Termination Plug	CSTERM00

[1] Visit www.redlion.net for a complete list of PID modules, data acquisition modules, communications drivers and cables.

[2] Free at www.redlion.net

7

LIMITED WARRANTY

The Company warrants the products it manufactures against defects in materials and workmanship for a period limited to two years from the date of shipment, provided the products have been stored, handled, installed, and used under proper conditions. The Company's liability under this limited warranty shall extend only to the repair or replacement of a defective product, at The Company's option. The Company disclaims all liability for any affirmation, promise or representation with respect to the products.

The customer agrees to hold Red Lion Controls harmless from, defend, and indemnify RLC against damages, claims, and expenses arising out of subsequent sales of RLC products or products containing components manufactured by RLC and based upon personal injuries, deaths, property damage, lost profits, and other matters which Buyer, its employees, or sub-contractors are or may be to any extent liable, including without limitation penalties imposed by the Consumer Product Safety Act (P.L. 92-573) and liability imposed upon any person pursuant to the Magnuson-Moss Warranty Act (P.L. 93-637), as now in effect or as amended hereafter.

No warranties expressed or implied are created with respect to The Company's products except those expressly contained herein. The Customer acknowledges the disclaimers and limitations contained herein and relies on no other warranties or affirmations.

red lion

Tel +1 (717) 767-6511
Fax +1 (717) 764-0839
www.redlion.net

Bulletin No. CS8-F
Drawing No. LP0556
Released 5/07

MODELS CSTC, CSRTD, CSINI, CSINV - MODULAR CONTROLLER SERIES ANALOG INPUT MODULES

- *DEDICATED HIGH DENSITY INPUT MODULES FOR THE MODULAR CONTROLLER SERIES*
- *MODELS AVAILABLE TO ACCEPT ±10 V, 0/4-20 mA, THERMOCOUPLE AND RTD INPUTS*
- *±10 V AND 0/4-20 mA INPUT VERSIONS FULLY SCALABLE*
- *±10 V AND 0/4-20 mA INPUT VERSIONS AVAILABLE WITH 100 POINT LINEARIZATION*
- *UNUSED INPUTS CAN BE DISABLED TO INCREASE OVERALL READING RATE*
- *IDEAL FOR DATA-ACQUISITION APPLICATIONS*
- *AUTO ADDRESSING MINIMIZES CONFIGURATION TIME*
- *CAN BE USED IN CONJUNCTION WITH ANY CS SERIES MODULES*

C **UL** US LISTED
IND. CONT. EQ.
34AD

CE

GENERAL DESCRIPTION

The Model CSTC, CSRTD, CSINI, and CSINV are 16-bit analog input modules designed for use with the Modular Controller Series. These modules provide a means of high-density signal measurement for data-acquisition applications. The CSTC module accepts a wide range of thermocouple types, while the CSRTD accepts various RTD inputs. The CSINI and CSINV accept 0/4-20 mA and ±10 V process signals, respectively.

The modules connect and communicate via a backplane connection to the CSMSTR Modular Controller Series Master. The CSMSTR, equipped with serial ports as well as an Ethernet port, allows the system to share data with PCs, PLCs, and SCADA systems. The Master supports any combination of up to 16 CS series modules, allowing a total of 128 signals to be monitored via a single Master.

Internal power management circuits allow the modules to be replaced while power is applied, which reduces downtime. All configuration information is stored locally within the module, as well as in the Master, so replacement modules do not need to be configured.

The Modular Controller Series' high density packaging and DIN rail mounting saves time and panel space. The backplane connection provides power and communication to the module and snaps easily onto standard top hat (T) profile DIN rail.

DIMENSIONS In inches (mm)

1.24 (31.5)

4.17 (105.9)

4.98 (126.5)

CONFIGURATION

The Modular Controller Series is configured with Windows® compatible Crimson™ software. The software is an easy to use, graphical interface which provides a means of configuration and commissioning of new systems, as well as routine module re-calibration.

SAFETY SUMMARY

All safety related regulations, local codes and instructions that appear in the manual or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Do not use the module to directly command motors, valves, or other actuators not equipped with safeguards. To do so can be potentially harmful to persons or equipment in the event of a fault to the module. An independent and redundant temperature limit indicator with alarm outputs is strongly recommended.
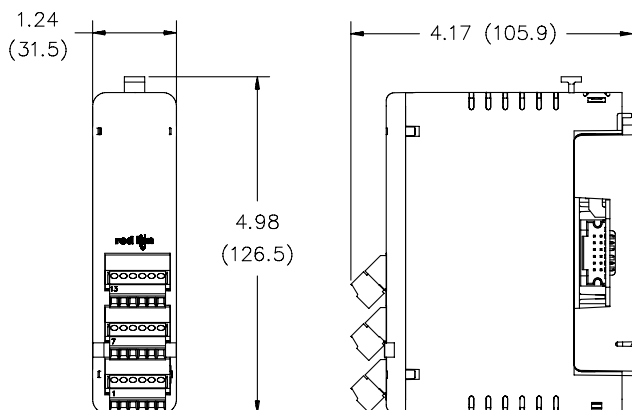
CAUTION: Risk of Danger.
Read complete instructions prior to installation and operation of the unit.

CAUTION: Risk of electric shock.

GENERAL SPECIFICATIONS

1. **POWER**: Derived from system backplane. (75 mA load on power input of MASTER). Module may be hot-swapped (replaced while powered up).
2. **LEDs**:
   STS - Status LED shows module condition.
   ALM - Alarm LED is lit during any internal alarm condition.
3. **MEMORY**: Non-volatile memory retains all programmable parameters. MASTER also stores the parameters in order to reprogram modules that are replaced.
4. **ISOLATION LEVEL**: 500 Vrms @ 50/60 Hz for 1 minute between the Signal Inputs and the CS Master Power Supply Input.
5. **COMMUNICATIONS**: Provided by the CS Master

GENERAL SPECIFICATIONS (CONT'D)

6. **CERTIFICATIONS AND COMPLIANCES**:
   SAFETY
   UL Listed, File # E302106, UL508, CSA C22.2 No. 14-M05
   LISTED by Und. Lab. Inc. to U.S. and Canadian safety standards
   IEC 61010-1, EN 61010-1: Safety requirements for electrical equipment
   for measurement, control, and laboratory use, Part 1.
   ELECTROMAGNETIC COMPATIBILITY
   Emissions and Immunity to EN 61326: Electrical Equipment for
   Measurement, Control and Laboratory use.
   Immunity to Industrial Locations:

Electrostatic discharge	EN 61000-4-2	Criterion B 4 kV contact discharge 8 kV air discharge
Electromagnetic RF fields	EN 61000-4-3	Criterion A, Criterion B[4] 10 V/m
Fast transients (burst)	EN 61000-4-4	Criterion A 2 kV power 1 kV signal
Surge	EN 61000-4-5	Criterion A, Criterion B[4] 1 kV L-L, 2 kV L&N-E power
RF conducted interference	EN 61000-4-6	Criterion A 3 V/rms

Emissions:

Emissions	EN 55011	Class A

Notes:
1. *Criterion A: Normal operation within specified limits.*
2. *Criterion B: Temporary loss of performance from which the unit self-recovers.*
3. *Power supplied from backplane via Master Module.*
4. *CSRTD600*

7. **ENVIRONMENTAL CONDITIONS**:
   Operating Temperature Range: 0 to +50°C
   Storage Temperature Range: -40 to +85°C
   Operating and Storage Humidity: 85% max relative humidity, non-condensing, from 0 to +50°C
   Vibration According to IEC 68-2-6: 10 to 150 Hz, 0.075 mm amplitude in X, Y, Z direction 1 g.
   Shock According to IEC 68-2-27: Operational 25 g, 11 msec in 3 directions.
   Altitude: Up to 2000 meters
8. **CONSTRUCTION**: Case body is burgundy high impact plastic. Installation Category I, Pollution Degree 2.
9. **CONNECTIONS**: Removable wire clamp screw terminal blocks
   Wire Gage: 28-16 AWG terminal gage wire
   Torque: 1.96-2.23 inch/lbs (0.22-0.25 N-m)
10. **MOUNTING**: Snaps on to standard DIN style top hat (T) profile mounting rails according to EN50022 -35 x 7.5 and -35 x 15.
11. **WEIGHT**: 6 oz (170.1 g)

CSTC8 SPECIFICATIONS

12. **INPUTS**:
   Channels: 8 single-ended
   Effective Resolution: Full 16-bit
   Sample Time: 50 msec - 400 msec, depending on number of enabled inputs.

ENABLED INPUTS	SCAN TIME (READING RATE)
1	50 msec (20 Hz)
2	100 msec (10 Hz)
3	150 msec (6.7 Hz)
4	200 msec (5 Hz)
5	250 msec (4 Hz)
6	300 msec (3.3 Hz)
7	350 msec (2.9 Hz)
8	400 msec (2.5 Hz)

Common Mode Rejection: >110 dB, 50/60 Hz
Normal Mode Rejection: >90 dB, 50/60 Hz
Temperature Coefficient: 0.01%/°C
Step Response Time: One scan time (to within 99% of final value)
Types: T, E, J, K, R, S, B, N, C
Slope & Offset: Provides sensor error correction
Input Impedance: 20 M Ω
Lead Resistance Effect: 0.25 µV/Ω
Cold Junction Compensation: Less than ±1°C typical (±1.5°C max) over 0 to 50 °C ambient temperature

Resolution: 0.1°

TYPE	MEASUREMENT RANGE	WIRE COLOR	
		ANSI	BS 1843
T	-200 to +400°C -328 to +752°F	(+) Blue (-) Red	(+) White (-) Blue
E	-200 to +730°C -328 to +1346°F	(+) Violet (-) Red	(+) Brown (-) Blue
J	-200 to +760°C -328 to +1400°F	(+) White (-) Red	(+) Yellow (-) Blue
K	-200 to +1250°C -328 to +2282°F	(+) Yellow (-) Red	(+) Brown (-) Blue
R	0 to +1768°C +32 to +3214°F	No Standard	(+) White (-) Blue
S	0 to +1768°C +32 to +3214°F	No Standard	(+) White (-) Blue
B	+149 to +1820°C +300 to +3308°F	No Standard	No Standard
N	-200 to +1300°C -328 to +2372°F	(+) Orange (-) Red	(+) Orange (-) Blue
C W5/W6	0 to +2315°C +32 to +4199°F	No Standard	No Standard

13. **TEMPERATURE INDICATION ACCURACY**: ± (0.3% of span, +1°C). Includes NIST conformity, cold junction effect, A/D conversion errors, temperature coefficient and linearization conformity at 23°C after 20 minute warm up.
14. **PROBE BREAK RESPONSE**: Upscale drive, Input Fault Alarm bit set high, ALM LED illuminates.

CSRTD6 SPECIFICATIONS

15. **RTD INPUTS**:
   Channels: 6 single-ended
   Effective Resolution: Full 16-bit
   Sample Time: 67 msec - 400 msec, depending on enabled inputs.

ENABLED INPUTS	SCAN TIME (READING RATE)
1	67 msec (14.9 Hz)
2	133 msec (7.5 Hz)
3	200 msec (5 Hz)
4	267 msec (3.8 Hz)
5	333 msec (3 Hz)
6	400 msec (2.5 Hz)

Common Mode Rejection: >110 dB, 50/60 Hz
Normal Mode Rejection: >90 dB, 50/60 Hz
Temperature Coefficient: 0.01%/°C
Step Response Time: One scan time (to within 99% of final value)
Type: 2 or 3 wire
Excitation: 150µA

Lead Resistance: 15 Ω Max
Resolution: 0.1°
Slope & Offset: Provides sensor error correction

TYPE	INPUT TYPE	RANGE
385	100 Ω platinum, Alpha = .00385	-200 to +600°C -328 to +1100°F
392	100 Ω platinum, Alpha = .003919	-200 to +600°C -328 to +1100°F
672	120 Ω nickel, Alpha = .00672	-80 to +215°C -112 to +419°F
Ohms	Linear resistance	0 Ω to 300 Ω

16. **TEMPERATURE INDICATION ACCURACY**: ± (0.1% of span) over 18 to 28°C environment, ± (0.2% of span) over 0 to 50°C environment. Includes NIST conformity, A/D conversion errors, temperature coefficient and linearization conformity at 23°C after 20 minute warm up.
17. **PROBE BREAK RESPONSE**: If channel is enabled: upscale drive, Input Fault Alarm bit set high, ALM LED illuminates.

CSINI8 SPECIFICATIONS

18. **INPUTS**:
    Channels: 8 single-ended
    Ranges: 0-20 mA or 4-20 mA
    Effective Resolution: Full 16-bit
    Programmable Scaling: ±30,000
    Linearizer: 100 Points (CSINI8L0 only)
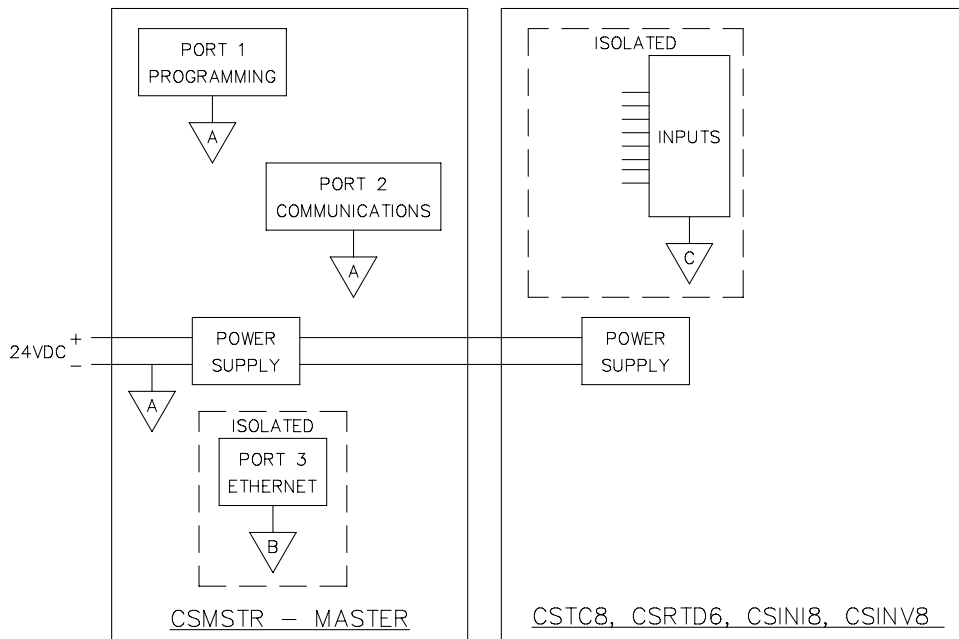   Sample Time: 50 msec - 400 msec, depending on number of enabled inputs.

ENABLED INPUTS	SCAN TIME (READING RATE)
1	50 msec (20 Hz)
2	100 msec (10 Hz)
3	150 msec (6.7 Hz)
4	200 msec (5 Hz)
5	250 msec (4 Hz)
6	300 msec (3.3 Hz)
7	350 msec (2.9 Hz)
8	400 msec (2.5 Hz)

Common Mode Rejection: >110 dB, 50/60 Hz
Normal Mode Rejection: >90 dB, 50/60 Hz
Step Response Time: One scan time (to within 99% of final value)
Input Impedance: 10 Ω
Max. Continuous Overload: 100 mA

19. **ACCURACY**: ±0.1% of span
20. **INPUT FAULT RESPONSE**: Upscale Drive, Input Fault Alarm bit set high, ALM LED illuminates below -3 mA, and above 23 mA for 0-20 mA range; below +3 mA and above 23 mA for 4-20 mA signals.

CSINV8 SPECIFICATIONS

21. **INPUTS**:
    Channels: 8 single-ended
    Ranges: 0-10 VDC or ±10 VDC
    Effective Resolution: Full 16-bit
    Programmable Scaling: ±30,000
    Linearizer: 100 Points (CSINV8L0 only)
    Sample Time: 50 msec - 400 msec, depending on number of enabled inputs.

ENABLED INPUTS	SCAN TIME (READING RATE)
1	50 msec (20 Hz)
2	100 msec (10 Hz)
3	150 msec (6.7 Hz)
4	200 msec (5 Hz)
5	250 msec (4 Hz)
6	300 msec (3.3 Hz)
7	350 msec (2.9 Hz)
8	400 msec (2.5 Hz)

Common Mode Rejection: >110 dB, 50/60 Hz
Normal Mode Rejection: >90 dB, 50/60 Hz
Step Response Time: One scan time (to within 99% of final value)
Input Impedance: 10 M Ω
Max. Continuous Overload: 50 V

22. **ACCURACY**: ±0.1% of span
23. **INPUT FAULT RESPONSE**: Upscale Drive, Input Fault Alarm bit set high, ALM LED illuminates below -10.4 VDC and above +10.4 VDC.

BLOCK DIAGRAM FOR
CSTC8, CSRTD6, CSINI8 & CSINV8

3

EMC INSTALLATION GUIDELINES

Although Red Lion Controls Products are designed with a high degree of immunity to Electromagnetic Interference (EMI), proper installation and wiring methods must be followed to ensure compatibility in each application. The type of the electrical noise, source or coupling method into a unit may be different for various installations. Cable length, routing, and shield termination are very important and can mean the difference between a successful or troublesome installation. Listed are some EMI guidelines for a successful installation in an industrial environment.

1. A unit should be mounted in a metal enclosure, which is properly connected to protective earth.
   a. The mounting clip that connects to the DIN rail should have the DIN rail connected to protective earth.
2. Use shielded (screened) cables for all Signal and Control inputs. The shield (screen) pigtail connection should be made as short as possible. The connection point for the shield depends somewhat upon the application. Listed below are the recommended methods of connecting the shield, in order of their effectiveness.
   a. Connect the shield to earth ground (protective earth) at one end where the unit is mounted.
   b. Connect the shield to earth ground at both ends of the cable, usually when the noise source frequency is over 1 MHz.
   c. Connect the shield to common of the module and leave the other end of the shield unconnected and insulated from earth ground.
3. Never run Signal or Control cables in the same conduit or raceway with AC power lines, conductors, feeding motors, solenoids, SCR controls, and heaters, etc. The cables should be run through metal conduit that is properly grounded. This is especially useful in applications where cable runs are long and portable two-way radios are used in close proximity or if the installation is near a commercial radio transmitter. Also, Signal or Control cables within an enclosure should be routed as far away as possible from contactors, control relays, transformers, and other noisy components.
4. Long cable runs are more susceptible to EMI pickup than short cable runs. Therefore, keep cable runs as short as possible.

5. In extremely high EMI environments, the use of external EMI suppression devices such as Ferrite Suppression Cores for signal and control cables is effective. The following EMI suppression devices (or equivalent) are recommended:
   Fair-Rite part number 0443167251 (RLC part number FCOR0000)
   TDK part number ZCAT3035-1330A
   Steward part number 28B2029-0A0
6. To protect relay contacts that control inductive loads and to minimize radiated and conducted noise (EMI), some type of contact protection network is normally installed across the load, the contacts or both. The most effective location is across the load.
   a. Using a snubber, which is a resistor-capacitor (RC) network or metal oxide varistor (MOV) across an AC inductive load is very effective at reducing EMI and increasing relay contact life.
   b. If a DC inductive load (such as a DC relay coil) is controlled by a transistor switch, care must be taken not to exceed the breakdown voltage of the transistor when the load is switched. One of the most effective ways is to place a diode across the inductive load. Most RLC products with solid state outputs have internal zener diode protection. However external diode protection at the load is always a good design practice to limit EMI. Although the use of a snubber or varistor could be used.
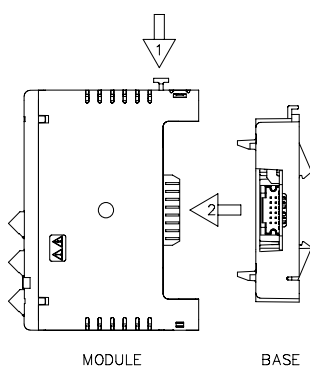   RLC part numbers: Snubber SNUB0000
   Varistor ILS11500 or ILS23000
   Note: Reference manufacturer's instructions when installing any EMI suppression device.
7. Also care should be taken when connecting input and output devices to the instrument. When a separate input and output common is provided, they should not be mixed. Therefore a sensor common should NOT be connected to an output common. This would cause EMI on the sensitive input common, which could effect the instrument's operation.
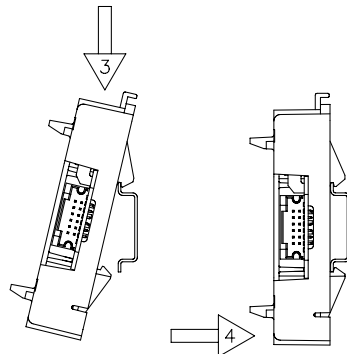
Visit RLC's web site at www.redlion.net for more information on EMI guidelines, Safety and CE issues as they relate to Red Lion Controls products.
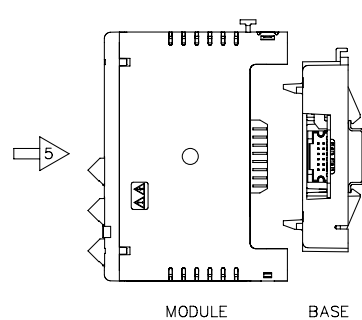
HARDWARE INSTALLATION

SEPARATE BASE FROM MODULE
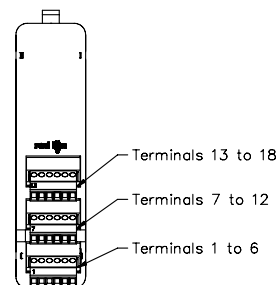
ATTACH THE MODULE BASE TO THE DIN RAIL

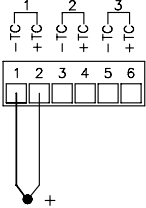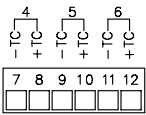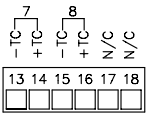### ATTACH MODULE TO BASE

WIRING

WIRING CONNECTIONS

All conductors should meet voltage and current ratings for each terminal. Also, cabling should conform to appropriate standards of good installation, local codes and regulations. When wiring the module, use the numbers on the label to identify the position number with the proper function. Strip the wire, leaving approximately 1/4" (6 mm) of bare wire exposed. Insert the wire into the terminal, and tighten.
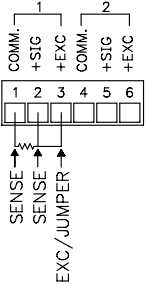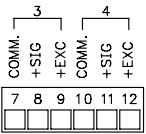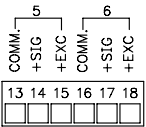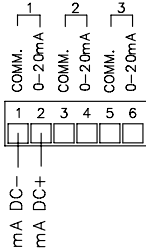
INPUT CONNECTIONS

CSTC **CSRTD** **CSINI** **CSINV**

CSTC columns:
- 7 − TC + TC, 8 − TC + TC, N/C N/C — terminals 13 14 15 16 17 18
- 4 − TC + TC, 5 − TC + TC, 6 − TC + TC — terminals 7 8 9 10 11 12
- 1 − TC + TC, 2 − TC + TC, 3 − TC + TC — terminals 1 2 3 4 5 6 (+)

CSRTD columns:
- 5 COMM. +SIG +EXC, 6 COMM. +SIG +EXC — terminals 13 14 15 16 17 18
- 3 COMM. +SIG +EXC, 4 COMM. +SIG +EXC — terminals 7 8 9 10 11 12
- 1 COMM. +SIG +EXC, 2 COMM. +SIG +EXC — terminals 1 2 3 4 5 6
  SENSE SENSE EXC/JUMPER

CSINI columns:
- 7 COMM. 0–20mA, 8 COMM. 0–20mA, N/C N/C — terminals 13 14 15 16 17 18
- 4 COMM. 0–20mA, 5 COMM. 0–20mA, 6 COMM. 0–20mA — terminals 7 8 9 10 11 12
- 1 COMM. 0–20mA, 2 COMM. 0–20mA, 3 COMM. 0–20mA — terminals 1 2 3 4 5 6
  mA DC− mA DC+

CSINV columns:
- 7 COMM. +/−10V, 8 COMM. +/−10V, N/C N/C — terminals 13 14 15 16 17 18
- 4 COMM. +/−10V, 5 COMM. +/−10V, 6 COMM. +/−10V — terminals 7 8 9 10 11 12
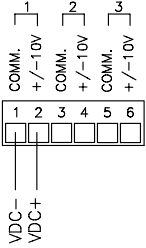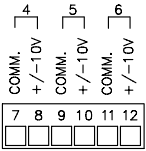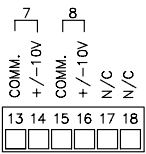- 1 COMM. +/−10V, 2 COMM. +/−10V, 3 COMM. +/−10V — terminals 1 2 3 4 5 6
  VDC− VDC+

LEDS

STS − STATUS LED

The Status LED is a dual color LED that provides information regarding the state of the module. This includes indication of the various stages of the start-up routine (power-up), as well as any errors that may occur.

Startup Routine

Rapidly Flashing Red	Module is currently running the boot loader and/or being flash upgraded by Crimson. This occurs for four seconds during a power up.
Steady Red	Module switching to configuration.
Green	Module performing normally.

FIRMWARE UPGRADE

The module's firmware is stored in flash memory so that software/hardware conflicts are avoided, and so that software features may be added in the future.

During a download, Crimson compares its own library of firmware files with those stored in the Master module. If they do not match, Crimson will download the necessary files. The Master then checks to make sure that the I/O modules contain the same firmware. If they contain a different revision, the Master will automatically copy those files into the module's flash memory. During this process, the module LEDs will flash rapidly, starting with the top row, and progressing through the remaining rows until the process is complete.

Error States

Solid Red	Module not controlling, and not communicating.
Green/Pulsing Red	Module is controlling properly, but has lost communication with the Master.

ALM − ALARM LED

The Alarm LED indicates the presence of an input fault condition. When one or more Input Fault Alarm bits is high, the LED turns on. The alarms may be disabled for unused inputs.

CONFIGURATION

Programming is done via Crimson, a Windows® compatible configuration interface. Please see the Crimson manual for more information.

ORDERING INFORMATION

TYPE	MODEL NO.	DESCRIPTION	PART NUMBER
Master Module	CSMSTR	Modular Controller Master, Multi Comms ports and Ethernet	CSMSTRV2
		Modular Controller Master with multiple protocol converter, data logger, web server with Virtual HMI up to QVGA (320 x 240) size and expansion slot.	CSMSTRSX
		Modular Controller Master with multiple protocol converter, data logger, web server with Virtual HMI up to VGA (640 x 480) size and expansion slot with increased SDRAM	CSMSTRGT
Input Modules	CSTC[1]	8 Channel Thermocouple Module	CSTC8000
	CSINI	8 Channel 0(4)-20 mA Input Module	CSINI800
		8 Channel 0(4)-20 mA Input Module, 100-Point Linearizer	CSINI8L0
	CSINV	8 Channel ±10 V Input Module	CSINV800
		8 Channel ±10 V Input Module, 100-Point Linearizer	CSINV8L0
	CSRTD	6 Channel RTD Module	CSRTD600
Communications Cables (10 feet)	CBL	Programming Cable for CS, G3, & Paradigm Series	CBLPROG0
		Communications Cables[1]	CBLxxxxx
Software		Crimson Programming Software[2]	SFCRM
		Crimson Programming Software, Manual, and Download Cable	SFCRK
Accessories		Rail Stops (Qty 2)	RSRSTP00
		Replacement Base	CSBASE00
		Replacement Termination Plug	CSTERM00

[1] Visit www.redlion.net for a complete list of PID modules, data acquisition modules, communications drivers and cables.

[2] Free at www.redlion.net

This page intentionally left blank

LIMITED WARRANTY

The Company warrants the products it manufactures against defects in materials and workmanship for a period limited to two years from the date of shipment, provided the products have been stored, handled, installed, and used under proper conditions. The Company's liability under this limited warranty shall extend only to the repair or replacement of a defective product, at The Company's option. The Company disclaims all liability for any affirmation, promise or representation with respect to the products.

The customer agrees to hold Red Lion Controls harmless from, defend, and indemnify RLC against damages, claims, and expenses arising out of subsequent sales of RLC products or products containing components manufactured by RLC and based upon personal injuries, deaths, property damage, lost profits, and other matters which Buyer, its employees, or sub-contractors are or may be to any extent liable, including without limitation penalties imposed by the Consumer Product Safety Act (P.L. 92-573) and liability imposed upon any person pursuant to the Magnuson-Moss Warranty Act (P.L. 93-637), as now in effect or as amended hereafter.

No warranties expressed or implied are created with respect to The Company's products except those expressly contained herein. The Customer acknowledges the disclaimers and limitations contained herein and relies on no other warranties or affirmations.

Red Lion Controls
20 Willow Springs Circle
York PA 17406
Tel +1 (717) 767-6511
Fax +1 (717) 764-0839

Red Lion Controls BV
Printerweg 10
NL - 3821 AD Amersfoort
Tel +31 (0) 334 723 225
Fax +31 (0) 334 893 793

Red Lion Controls AP
31, Kaki Bukit Road 3,
#06-04/05 TechLink
Singapore 417818
Tel +65 6744-6613
Fax +65 6743-3360

red lion®

Tel +1 (717) 767-6511
Fax +1 (717) 764-0839
www.redlion.net

MODEL DSPLE – DATA STATION PLUS

c(UL)US LISTED
IND. CONT. EQ.
34AD

- CONVERTS NUMEROUS PROTOCOLS SIMULTANEOUSLY
- EXTENSIVE BUILT-IN DRIVER LIST ALLOWS EASY DATA MAPPING TO PLCs, PCs, AND SCADA SYSTEMS
- 10 BASE-T/100BASE-TX ETHERNET PORT SUPPORTS FOUR SIMULTANEOUS PROTOCOLS
- INDEPENDENT SERIAL PORTS PROVIDE VIRTUALLY UNLIMITED INTEGRATION METHODS
- SUPPORTS UP TO NINE PROTOCOLS SIMULTANEOUSLY(with expansion card)

CE

c(UL)US LISTED
3PWL
PROGRAMMABLE
CONTROLLERS

*FOR USE IN HAZARDOUS LOCATIONS:
Class I, Division 2, Groups A, B, C, and D*

GENERAL DESCRIPTION

The Data Station Plus was designed to act as a nexus for industrial data collection and management. With three built in serial ports and a 10 Base-T/100 Base-TX Ethernet port, the unit performs protocol conversion, allowing disparate devices to communicate seamlessly with one another. The Ethernet port supports up to four protocols simultaneously so even Ethernet to Ethernet conversion may be performed.

The CompactFlash card allows new configuration files to be loaded into the Data Station Plus. The USB port may be used for blazing fast file downloads, or to mount the Data Station's CompactFlash card as an external drive to your PC. The Data Station's DIN rail mounting saves time and panel space and snaps easily onto standard top hat (T) profile DIN rail.

SOFTWARE

The Data Station is programmed with Crimson® 2.0 software for Windows® 2000 or later platforms. The software is an easy to use graphical interface which can be purchased as part of a kit that includes a manual and cables, or downloaded free of charge from www.redlion.net.

SAFETY SUMMARY

All safety related regulations, local codes and instructions that appear in the manual or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Do not use the controller to directly command motors, valves, or other actuators not equipped with safeguards. To do so can be potentially harmful to persons or equipment in the event of a fault to the controller. An independent and redundant temperature limit indicator with alarm outputs is strongly recommended.

> ⚠ **CAUTION: Risk of Danger.**
> Read complete instructions prior to
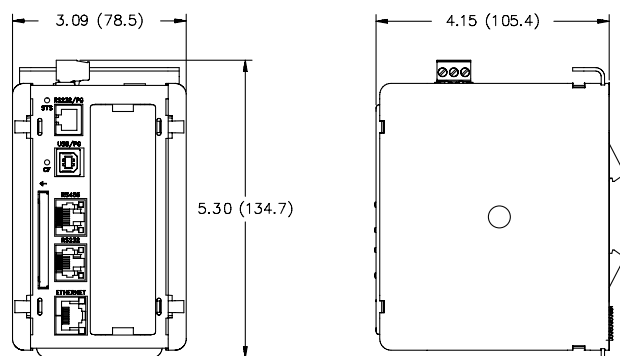> installation and operation of the unit.

⚠ WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2

⚠ THIS EQUIPMENT IS SUITABLE FOR USE IN CLASS I, DIVISION 2, GROUPS A, B, C, D, OR NON-HAZARDOUS LOCATIONS ONLY

CompactFlash is a registered trademark of CompactFlash Association.

DIMENSIONS In inches (mm)

3.09 (78.5)
4.15 (105.4)
5.30 (134.7)

SPECIFICATIONS

1. **POWER**: 24 VDC ± 10%
   200 mA min., without expansion card
   1 Amp maximum with expansion card fitted
   Must use Class 2 or SELV rated power supply.
2. **COMMUNICATIONS**:
   USB/PG Port: Adheres to USB specification 1.1. Device only using Type B connection.

⚠ WARNING - DO NOT CONNECT OR DISCONNECT CABLES WHILE POWER IS APPLIED UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS. USB PORT IS FOR SYSTEM SET-UP AND DIAGNOSTICS AND IS NOT INTENDED FOR PERMANENT CONNECTION.

   Serial Ports: Format and Baud Rates for each port are individually software programmable up to 115,200 baud.
   RS232/PG Port: RS232 port via RJ12
   COMMS Ports: RS422/485 port via RJ45, and RS232 port via RJ12
   DH485 TXEN: Transmit enable; open collector, V_{OH} = 15 VDC,
      V_{OL} = 0.5 V @ 25 mA max.
   Ethernet Port: 10 BASE-T / 100 BASE-TX
      RJ45 jack is wired as a NIC (Network Interface Card).
3. **LEDs**:
   STS – Status LED indicates condition of Data Station.
   TX/RX – Transmit/Receive LEDs show serial activity.
   Ethernet – Link and activity LEDs.
   CF – CompactFlash LED indicates card status and read/write activity
4. **MEMORY**:
   On-board User Memory: 4 Mbytes of non-volatile Flash memory.
   On-board SDRAM: 2 Mbytes
   Memory Card: CompactFlash Type II slot for Type I and Type II cards.
      Used for optional database storage only
5. **REAL-TIME CLOCK**: Typical accuracy is less than one minute per month drift.
   Battery: Lithium Coin Cell. Typical lifetime of 10 years at 25 ºC.
      A "Battery Low" system variable is available so that the programmer can choose specific action(s) to occur when the battery voltage drops below its nominal voltage.
6. **ENVIRONMENTAL CONDITIONS**:
   Operating Temperature Range: 0 to 50°C
   Storage Temperature Range: -30 to +70°C
   Operating and Storage Humidity: 80% max relative humidity, non-condensing, from 0 to 50°C
   Vibration According to IEC 68-2-6: Operational 5 to 150 Hz, in X, Y, Z direction for 1.5 hours, 2 g's.
   Shock According to IEC 68-2-27: Operational 30 g, 11 msec in 3 directions.
   Altitude: Up to 2000 meters
7. **CONSTRUCTION**: Case body is burgundy high impact plastic and stainless steel. Installation Category I, Pollution Degree 2.
8. **POWER CONNECTION**: Removable wire clamp screw terminal block.
   Wire Gage Capacity: 24 AWG to 12 AWG
   Torque: 4.45 to 5.34 in/lb (0.5 to 0.6 N-m)
9. **MOUNTING**: Snaps onto standard DIN style top hat (T) profile mounting rails according to EN50022 -35 x 7.5 and -35 x 15.
10. **CERTIFICATIONS AND COMPLIANCES**:
    SAFETY
    UL Listed, File #E302106, UL508, CSA 22.2 No. 14-M05
       LISTED by Und. Lab. Inc. to U.S. and Canadian safety standards
    UL Listed, File #E317425, ANSI/ISA 12.12.01-2007, CSA 22.2 No. 213-M1987
       LISTED by Und. Lab. Inc. to U.S. and Canadian safety standards
    IEC 61010-1, EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1.
    ELECTROMAGNETIC COMPATIBILITY
       Emissions and Immunity to EN 61326: Electrical Equipment for Measurement, Control and Laboratory use.

Immunity to Industrial Locations:

Electrostatic discharge	EN 61000-4-2	Criterion A [2] 4 kV contact discharge 8 kV air discharge
Electromagnetic RF fields	EN 61000-4-3	Criterion A 10 V/m
Fast transients (burst)	EN 61000-4-4	Criterion A 2 kV power 2 kV signal
Surge	EN 61000-4-5	Criterion A 1kV L-L,2 kV L&N-E power
RF conducted interference	EN 61000-4-6	Criterion A 3 V/rms

Emissions:

Emissions	EN 55011	Class A

Notes:
1. Criterion A: Normal operation within specified limits.
2. This device was designed for installation in an enclosure. To avoid electrostatic discharge to the unit in environments with static levels above 4 kV precautions should be taken when the device is mounted outside an enclosure. When working in an enclosure (ex. making adjustments, setting jumpers etc.) typical anti-static precautions should be observed before touching the unit.

11. **WEIGHT**: 15.1 oz (456.4 g)

⚠ WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR AREA IS KNOWN TO BE NON-HAZARDOUS.

HARDWARE
INSTALLATION

DIN rail should be mounted horizontally so that the unit's ventilation holes are vertical in relation to cabinet orientation. A minimum clearance of 1 inch (25.4 mm) should be maintained above and below the unit in order to ensure proper thermal regulation.
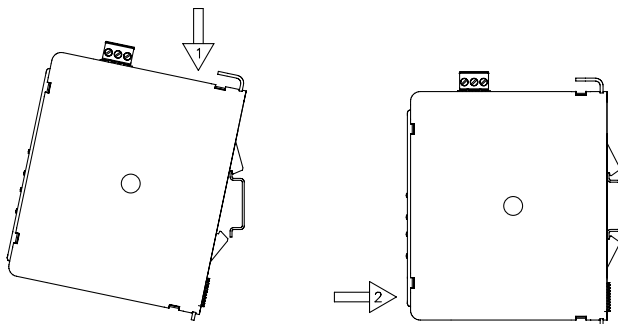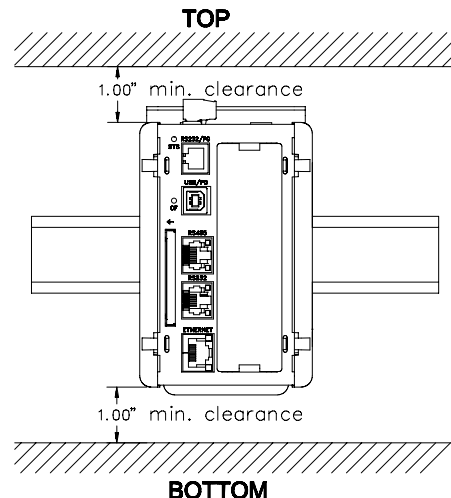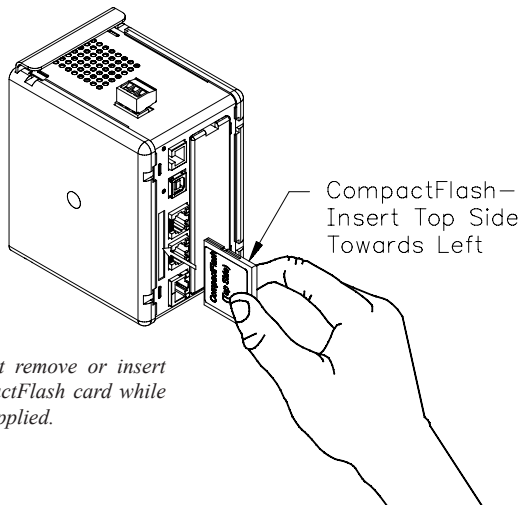

Figure 1 - Attach Data Station To DIN Rail

COMPACTFLASH® CARD

CompactFlash socket is a Type II socket that can accept either Type I or II cards. Use cards with a minimum of 4 Mbytes and a maximum of 2 Gbytes with the Data Station's CompactFlash socket. Cards are available at most computer and office supply retailers. The CompactFlash can be used for optional database storage only.

CompactFlash—
Insert Top Side
Towards Left

Note: Do not remove or insert the CompactFlash card while power is applied.

Information stored on a CompactFlash card can be read by a card reader attached to a PC. This information is stored in IBM (Windows®) PC compatible FAT16 file format.

NOTE

For reliable operation in all of our products, Red Lion recommends the use of SanDisk® and SimpleTech brands of CompactFlash cards.

Industrial grade versions that provide up to two million write/erase cycles minimum are available from Red Lion.

POWER SUPPLY REQUIREMENTS

It is very important that the power supply is mounted correctly if the unit is to operate reliably. Please take care to observe the following points:

– The power supply must be mounted close to the unit, with usually not more than 6 feet (1.8 m) of cable between the supply and the Data Station. Ideally, the shortest length possible should be used.

– The wire used to connect the Data Station's power supply should be at least 22-gage wire. If a longer cable run is used, a heavier gage wire should be used. The routing of the cable should be kept away from large contactors, inverters, and other devices which may generate significant electrical noise.

– A power supply with a Class 2 or SELV rating is to be used. A Class 2 or SELV power supply provides isolation to accessible circuits from hazardous voltage levels generated by a mains power supply due to single faults. SELV is an acronym for "safety extra-low voltage." Safety extra-low voltage circuits shall exhibit voltages safe to touch both under normal operating conditions and after a single fault, such as a breakdown of a layer of basic insulation or after the failure of a single component has occurred.

Visit www.redlion.net for a complete list of our PSDR Series of Class 2 power supplies.

EMC INSTALLATION GUIDELINES

Although Red Lion Controls Products are designed with a high degree of immunity to Electromagnetic Interference (EMI), proper installation and wiring methods must be followed to ensure compatibility in each application. The type of the electrical noise, source or coupling method into a unit may be different for various installations. Cable length, routing, and shield termination are very important and can mean the difference between a successful or troublesome installation. Listed are some EMI guidelines for a successful installation in an industrial environment.

1. To reduce the chance of noise spikes entering the unit via the power lines, connections should be made to a clean source. Connecting to circuits that also power loads such as contactors, relays, motors, solenoids etc. should be avoided.
2. The unit should be mounted in a metal enclosure, which is properly connected to protective earth.
3. Use shielded (screened) cables for all Signal and Control inputs. The shield (screen) pigtail connection should be made as short as possible. The connection point for the shield depends somewhat upon the application. Listed below are the recommended methods of connecting the shield, in order of their effectiveness.
   a. Connect the shield to earth ground (protective earth) at one end where the unit is mounted.
   b. Connect the shield to earth ground at both ends of the cable, usually when the noise source frequency is over 1 MHz.
   c. Connect the shield to common of the Data Station and leave the other end of the shield unconnected and insulated from earth ground.

4. Never run Signal or Control cables in the same conduit or raceway with AC power lines, conductors feeding motors, solenoids, SCR controls, and heaters, etc. The cables should be run through metal conduit that is properly grounded. This is especially useful in applications where cable runs are long and portable two-way radios are used in close proximity or if the installation is near a commercial radio transmitter. Also, Signal or Control cables within an enclosure should be routed as far away as possible from contactors, control relays, transformers, and other noisy components.
5. Long cable runs are more susceptible to EMI pickup than short cable runs. Therefore, keep cable runs as short as possible.
6. In extremely high EMI environments, the use of external EMI suppression devices is effective. The following EMI suppression devices (or equivalent) are recommended:
   Ferrite Suppression Cores for signal and control cables:
       Fair-Rite part number 0443167251 (RLC part number FCOR0000)
       TDK part number ZCAT3035-1330A
       Steward part number 28B2029-0A0
   Line Filters for input power cables:
       Schaffner part number FN610-1/07 (RLC part number LFIL0000)
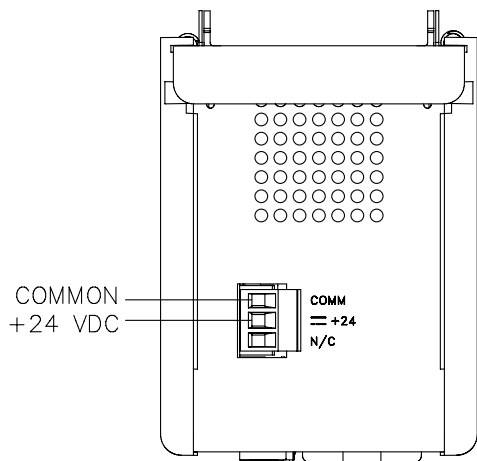   Schaffner part number FN670-1.8/07
       Corcom part number 1 VR3

Visit RLC's web site at www.redlion.net for more information on EMI guidelines, Safety and CE issues as they relate to Red Lion Controls products.
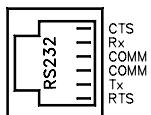
WIRING
POWER CONNECTION

COMMON
+24 VDC

COMM
≡ +24
N/C

PROGRAMMING PORTS

RS232/PG

RS232

CTS
Rx
COMM
COMM
Tx
RTS

USB/PG

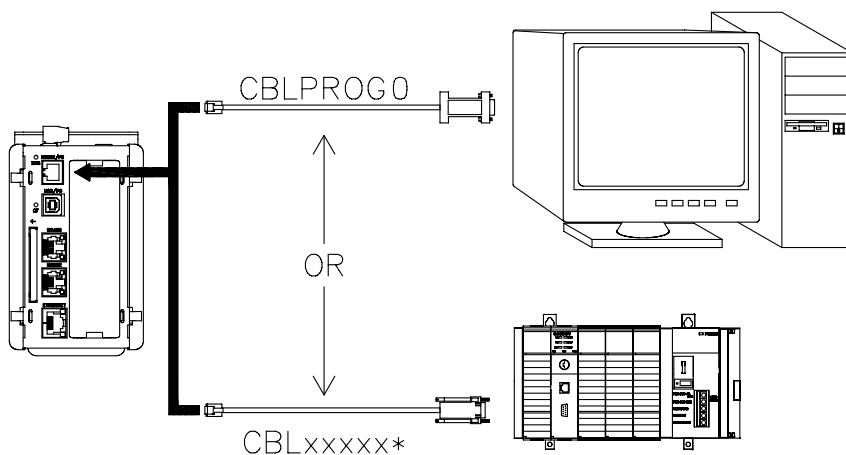**ETHERNET**

GREEN/AMBER LED

YELLOW LED

CBLPROG0

OR

CBLUSB00

OR

Ethernet (Crossover)

COMMUNICATION PORTS

RS232/PG

RS232

CTS
Rx
COMM
COMM
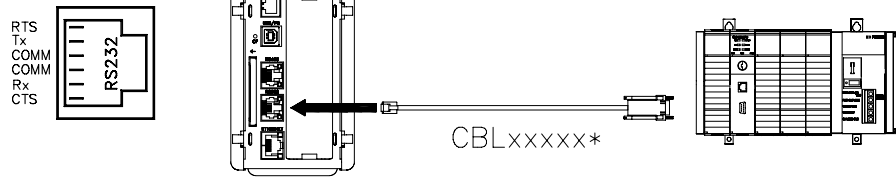Tx
RTS

CBLPROG0

OR

CBLxxxxx*

4

RS232

RTS
Tx
COMM
COMM
Rx
CTS

RS232

CBLxxxxx*

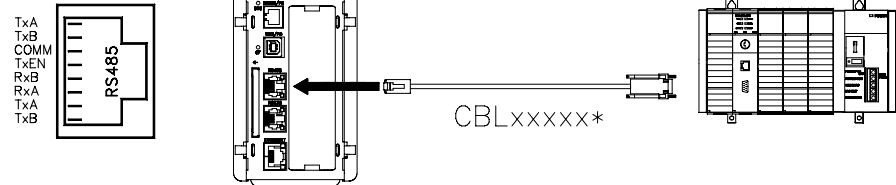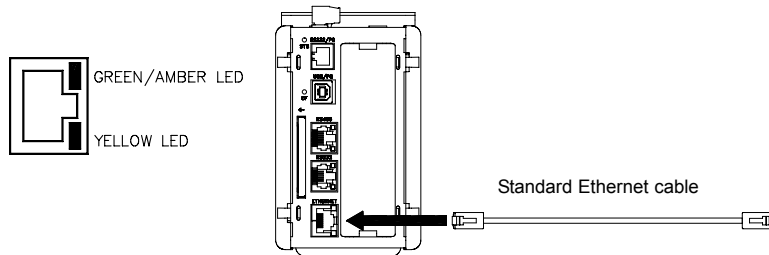* Use appropriate communications cable. See Ordering Information for descriptions of the available cables.

RS485

TxA
TxB
COMM
TxEN
RxB
RxA
TxA
TxB

RS485

CBLxxxxx*

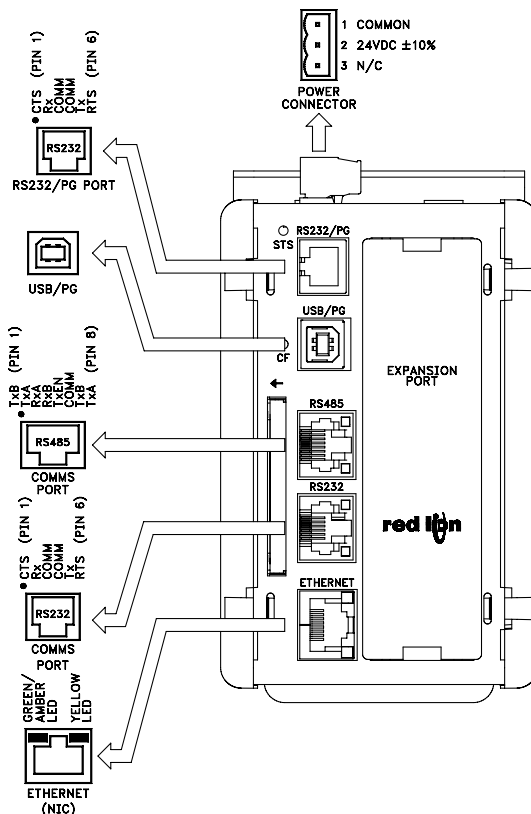**WARNING:** Do **NOT** use a standard DH-485 cable to connect this port to Allen Bradley equipment.

PORT 3 - ETHERNET CONNECTION

GREEN/AMBER LED

YELLOW LED

Standard Ethernet cable

DATA STATION PORT PIN OUTS

1 COMMON
2 24VDC ±10%
3 N/C

POWER CONNECTOR

CTS (PIN 1)
Rx
COMM
COMM
Tx
RTS (PIN 6)

RS232

RS232/PG PORT

USB/PG

TxB (PIN 1)
RxA
RxB
TxEN
COMM
TxB (PIN 8)
TxA

RS485

COMMS PORT

CTS (PIN 1)
Rx
COMM
COMM
Tx
RTS (PIN 6)

RS232

COMMS PORT

GREEN/AMBER LED
YELLOW LED

ETHERNET (NIC)

RS232/PG
STS

USB/PG

CF

EXPANSION PORT

RS485

RS232

red lion

ETHERNET

TROUBLESHOOTING

If for any reason you have trouble operating, connecting, or simply have questions concerning your new Data Station, contact Red Lion's technical support. For contact information, refer to the back page of this bulletin for phone and fax numbers.

EMAIL: techsupport@redlion.net
Web Site: http://www.redlion.net

COMMUNICATING WITH THE DATA STATION

CONFIGURING A DATA STATION

The Data Station is configured using Crimson® 2.0 software. Crimson 2.0 is available as a free download from Red Lion's website, or it can be ordered on CD. Updates the software for new features and drivers are posted on the website as they become available. By configuring the Data Station using the latest version of the software, you are assured that your unit has the most up to date feature set. Crimson® 2.0 software can configure the Data Station through the RS232/PG port, USB/PG port, Ethernet, or CompactFlash. The USB/PG port is connected using a standard USB cable with a Type B connector.

The driver needed to use the USB port will be installed with Crimson 2.0. The RS232/PG port uses a programming cable made by Red Lion to connect to the DB9 COM port of your computer. If making your own cable, refer to the "Data Station Port Pin Outs" for wiring information.

The CompactFlash can be used to program a Data Station by placing a configuration file and firmware on the CompactFlash card. The card is then inserted into the target Data Station and powered. Refer to the Crimson® 2.0 literature for more information on the proper names and locations of the files.

CABLES AND DRIVERS

Red Lion has a wide range of cables and drivers for use with many different communication types. A list of these drivers and cables along with pin outs is available from Red Lion's website. New cables and drivers are added on a regular basis. If making your own cable, refer to the "Data Station Port Pin Outs" for wiring information.

USB, DATA TRANSFERS FROM THE COMPACTFLASH CARD

⚠️ WARNING - DO NOT CONNECT OR DISCONNECT CABLES WHILE POWER IS APPLIED UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS. USB PORT IS FOR SYSTEM SET-UP AND DIAGNOSTICS AND IS NOT INTENDED FOR PERMANENT CONNECTION.

In order to transfer data from the CompactFlash card via the USB port, a driver must be installed on your computer. This driver is installed with Crimson 2.0 and is located in the folder C:\Program Files\Red Lion Controls\Crimson 2.0\Device\ after Crimson 2.0 is installed. This may have already been accomplished if your Data Station was configured using the USB port.

Once the driver is installed, connect the Data Station to your PC with a USB cable, and follow "Mounting the CompactFlash" instructions in the Crimson 2.0 user manual.

Note: The USB port is for system set-up and diagnostics and is not intended for permanent connection.

ETHERNET COMMUNICATIONS

Ethernet communications can be established at either 10 BASE-T or 100 BASE-TX. The Data Station's RJ45 jack is wired as a NIC (Network Interface Card). For example, when wiring to a hub or switch use a straight-through cable, but when connecting to another NIC use a crossover cable.
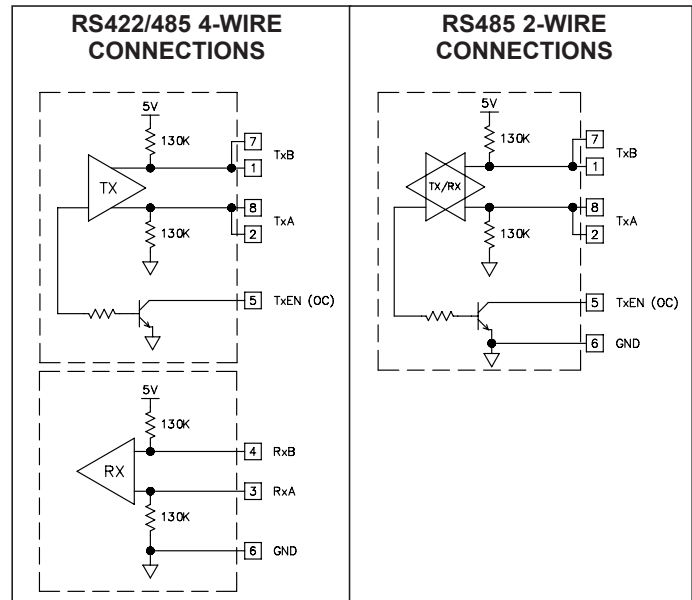
The Crimson 2.0 manual contains additional information on Ethernet communications.

RS232 PORTS

The Data Station has two RS232 ports. There is the RS232/PG port and the COMMS port. Although only one of these ports can be used for programming, both ports can be used for communications with a PLC. The RS232/PG port can be used for either master or slave protocols.

RS422/485 PORT

The Data Station has one RS422/485 port. This port can be configured to act as either RS422 or RS485.

Note: All Red Lion® devices connect A to A and B to B, except for Paradigm devices. Refer to www.redlion.net for additional information.

DH485 COMMUNICATIONS

The Data Station's RS422/485 COMMS port can also be used for Allen Bradley DH485 communications.

WARNING: DO NOT use a standard DH485 cable to connect this port to Allen Bradley equipment. A cable and wiring diagram are available from Red Lion.

LEDS

STS – STATUS LED

The green Status LED provides information regarding the state of the Data Station. This includes indication of the various stages of the start-up routine (power-up), and any errors that may occur.

Startup Routine

	INDICATION
Rapidly Flashing	Data Station is currently running the boot loader and/or being flash upgraded by Crimson.
Steady	Data Station is operating properly.

CF – COMPACTFLASH LED

LED	INDICATION
Off	No CompactFlash Card is present.
Steady	Valid CompactFlash card is present.
Flashing Rapidly	CompactFlash card is being checked.
Flickering	Unit is writing to the CompactFlash, either because it is storing data, or because the PC connected via the USB port has locked the drive. [1]
Flashing Slowly	Incorrectly formatted CompactFlash card present.

1. *Do not turn off power to the unit while this light is flickering. The unit writes data in two minute intervals. Later Microsoft operating systems will not lock the drive unless they need to write data; Windows 98 may lock the drive any time it is mounted, thereby interfering with logging. Refer to "Mounting the CompactFlash" in the Crimson 2.0 User Manual.*

USER COMMUNICATION PORTS - TX/RX LEDS

LED	INDICATION
GREEN	Transmitting
RED	Receiving

Note: LEDs are not available on the Programming Port: RS232/PG.

ETHERNET LEDS

LED	INDICATION
YELLOW (Solid)	Link Established
YELLOW (Flashing)	Network Activity
GREEN	10 BASE-T Communications
AMBER	100 BASE-TX Communications

ORDERING INFORMATION

TYPE	MODEL NO.	DESCRIPTION	PART NUMBER
Data Station Plus	DSP	Data Station with multiple protocol converter, Comms, Ethernet and expansion slot.	DSPLE000
		Data Station with multiple protocol converter, data logger, web server with Virtual HMI up to QVGA (320 x 240) and expansion slot.	DSPSX000
		Data Station with multiple protocol converter, data logger, web server with Virtual HMI up to VGA (640 x 480) size and expansion slot with increased SDRAM.	DSPGT000
Communications Cables (10 feet)	CBL	RS-232 Programming Cable	CBLPROG0
		USB Cable	CBLUSB00
		Communications Cables [1]	CBLxxxxx
Software	SFCRM2	Crimson® 2.0 [2], Manual and Download Cable	SFCRM200
Power Supply	PSDR	DIN Rail Power Supply	PSDRxxxx
Accessories	XCCN	CANopen option card for Modular Controller or Data Station Plus	XCCN0000
	XCDN	DeviceNet option card for Modular Controller or Data Station Plus	XCDN0000
	XCPB	PROFIBUS option card for Modular Controller or Data Station Plus	XCPBDP00
	XCRS	RS232/485 option card for Modular Controller or Data Station Plus	XCRS0000
	G3CF	64 MB CompactFlash Card [4]	G3CF064M
		256 MB CompactFlash Card [4]	G3CF256M
		512 MB CompactFlash Card [4]	G3CF512M
	DR	DIN Rail Mountable Adapter Products [3]	DRxxxxxx

[1] Visit www.redlion.net for a list of communication drivers and cables.

[2] Use this part number to purchase the Crimson® software on CD with a printed manual, USB cable, and RS-232 cable. Otherwise, download free of charge from www.redlion.net.

[3] Red Lion offers RJ modular jack adapters. Refer to the DR literature for complete details.

[4] Industrial grade two million write cycles.

LIMITED WARRANTY

The Company warrants the products it manufactures against defects in materials and workmanship for a period limited to two years from the date of shipment, provided the products have been stored, handled, installed, and used under proper conditions. The Company's liability under this limited warranty shall extend only to the repair or replacement of a defective product, at The Company's option. The Company disclaims all liability for any affirmation, promise or representation with respect to the products.

The customer agrees to hold Red Lion Controls harmless from, defend, and indemnify RLC against damages, claims, and expenses arising out of subsequent sales of RLC products or products containing components manufactured by RLC and based upon personal injuries, deaths, property damage, lost profits, and other matters which Buyer, its employees, or sub-contractors are or may be to any extent liable, including without limitation penalties imposed by the Consumer Product Safety Act (P.L. 92-573) and liability imposed upon any person pursuant to the Magnuson-Moss Warranty Act (P.L. 93-637), as now in effect or as amended hereafter.

No warranties expressed or implied are created with respect to The Company's products except those expressly contained herein. The Customer acknowledges the disclaimers and limitations contained herein and relies on no other warranties or affirmations.

red lion®

Tel +1 (717) 767-6511
Fax +1 (717) 764-0839
www.redlion.net

MODEL DSP – DATA STATION PLUS

C UL US LISTED
IND. CONT. EQ.
34AD

- *PROTOCOL CONVERSION FEATURE CONVERTS NUMEROUS PROTOCOLS SIMULTANEOUSLY*
- *COMPACTFLASH® SLOT ALLOWS PROCESS DATA TO BE LOGGED DIRECTLY TO CSV FILES*
- *VIRTUAL HMI OFFERS BUILT-IN PC-BASED SCADA FUNCTIONALITY*
- *WEBSERVER PROVIDES WORLDWIDE ACCESS TO DATA LOGS AND VIRTUAL HMI*
- *EXTENSIVE BUILT-IN DRIVER LIST ALLOWS EASY DATA MAPPING TO PLCs, PCs, AND SCADA SYSTEMS*
- *ALARM NOTIFICATIONS CAN BE SENT VIA EMAIL OR TEXT MESSAGES*
- *10 BASE-T/100 BASE-TX ETHERNET CONNECTION CAN CONNECT TO AN UNLIMITED NUMBER OF DEVICES VIA FOUR PROTOCOLS SIMULTANEOUSLY*

C UL US LISTED
3PWL
PROGRAMMABLE
CONTROLLERS

FOR USE IN HAZARDOUS LOCATIONS:
Class I, Division 2, Groups A, B, C, and D

CE

GENERAL DESCRIPTION

The Data Station Plus was designed to act as a nexus for industrial data collection and management. The unit offers multiple protocol conversion, data logging and remote machine access. With three built in serial ports and a 10 Base-T/100 Base-TX Ethernet port, the unit performs protocol conversion, allowing disparate devices to communicate seamlessly with one another. The Ethernet port supports up to four protocols simultaneously so even Ethernet to Ethernet protocols can be converted.

The CompactFlash card allows data to be collected and stored for later review. The files are stored in simple CSV file format allowing common applications, such as Microsoft Excel and Access, to view and manage the data. The free Websync utility provides a means to synchronize the files with a PC's hard drive for permanent storage. The CompactFlash card may also be used to load new configuration files into the Data Station.

The built-in web server allows log files to be retrieved manually, and also provides access to the unique "virtual HMI". The virtual HMI is programmed just like Red Lion's G3 series of HMI. Any standard web browser such as Internet Explorer or Netscape may be used to monitor or control the HMI from a PC anywhere in the world.

The USB port may be used for blazing fast file downloads, or to mount the Data Station's CompactFlash card as an external drive to your PC.

The Data Station's DIN rail mounting saves time and panel space and snaps easily onto standard top hat (T) profile DIN rail.

SOFTWARE

The Data Station is programmed with Crimson® 2.0 software for Windows® 2000 or later platforms. The software is an easy to use graphical interface which can be purchased as part of a kit that includes a manual and cables, or downloaded free of charge from www.redlion.net.

SAFETY SUMMARY

All safety related regulations, local codes and instructions that appear in the manual or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Do not use the controller to directly command motors, valves, or other actuators not equipped with safeguards. To do so can be potentially harmful to persons or equipment in the event of a fault to the controller. An independent and redundant temperature limit indicator with alarm outputs is strongly recommended.

> ⚠ **CAUTION: Risk of Danger.**
> Read complete instructions prior to
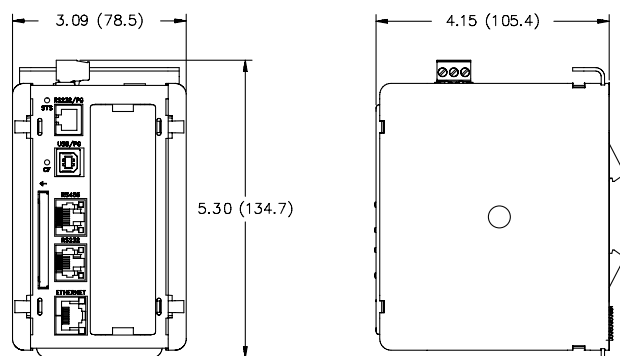> installation and operation of the unit.

⚠ WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2

⚠ THIS EQUIPMENT IS SUITABLE FOR USE IN CLASS I, DIVISION 2, GROUPS A, B, C, D, OR NON-HAZARDOUS LOCATIONS ONLY

CompactFlash is a registered trademark of CompactFlash Association.

DIMENSIONS In inches (mm)

3.09 (78.5)

4.15 (105.4)

5.30 (134.7)

1

SPECIFICATIONS

1. **POWER**: 24 VDC ± 10%
   200 mA min., without expansion card
   1 Amp maximum with expansion card fitted
   Must use Class 2 or SELV rated power supply.
2. **COMMUNICATIONS**:
   USB/PG Port: Adheres to USB specification 1.1. Device only using Type B connection.

> ⚠️ WARNING - DO NOT CONNECT OR DISCONNECT CABLES WHILE POWER IS APPLIED UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS. USB PORT IS FOR SYSTEM SET-UP AND DIAGNOSTICS AND IS NOT INTENDED FOR PERMANENT CONNECTION.

   Serial Ports: Format and Baud Rates for each port are individually software programmable up to 115,200 baud.
   RS232/PG Port: RS232 port via RJ12
   COMMS Ports: RS422/485 port via RJ45, and RS232 port via RJ12
   DH485 TXEN: Transmit enable; open collector, V_{OH} = 15 VDC,
   V_{OL} = 0.5 V @ 25 mA max.
   Ethernet Port: 10 BASE-T / 100 BASE-TX
   RJ45 jack is wired as a NIC (Network Interface Card).
3. **LEDs**:
   STS – Status LED indicates condition of Data Station.
   TX/RX – Transmit/Receive LEDs show serial activity.
   Ethernet – Link and activity LEDs.
   CF – CompactFlash LED indicates card status and read/write activity
4. **MEMORY**:
   On-board User Memory: 4 Mbytes of non-volatile Flash memory.
   On-board SDRAM:
      DSPSX: 2 Mbytes
      DSPGT: 8 Mbytes
   Memory Card: CompactFlash Type II slot for Type I and Type II cards.
5. **REAL-TIME CLOCK**: Typical accuracy is less than one minute per month drift. Crimson 2.0's SNTP facility allows synchronization with external servers.
   Battery: Lithium Coin Cell. Typical lifetime of 10 years at 25 ºC.
      A "Battery Low" system variable is available so that the programmer can choose specific action(s) to occur when the battery voltage drops below its nominal voltage.
6. **ENVIRONMENTAL CONDITIONS**:
   Operating Temperature Range: 0 to 50°C
   Storage Temperature Range: -30 to +70°C
   Operating and Storage Humidity: 80% max relative humidity, non-condensing, from 0 to 50°C
   Vibration According to IEC 68-2-6: Operational 5 to 150 Hz, in X, Y, Z direction for 1.5 hours, 2 g's.
   Shock According to IEC 68-2-27: Operational 30 g, 11 msec in 3 directions.
   Altitude: Up to 2000 meters

7. **CONSTRUCTION**: Case body is burgundy high impact plastic and stainless steel. Installation Category I, Pollution Degree 2.
8. **POWER CONNECTION**: Removable wire clamp screw terminal block.
   Wire Gage Capacity: 24 AWG to 12 AWG
   Torque: 4.45 to 5.34 in/lb (0.5 to 0.6 N-m)
9. **MOUNTING**: Snaps onto standard DIN style top hat (T) profile mounting rails according to EN50022 -35 x 7.5 and -35 x 15.
10. **CERTIFICATIONS AND COMPLIANCES**:
    SAFETY
    UL Listed, File #E302106, UL508, CSA 22.2 No. 14-M05
       LISTED by Und. Lab. Inc. to U.S. and Canadian safety standards
    UL Listed, File #E317425, ANSI/ISA 12.12.01-2007, CSA 22.2 No. 213-M1987
       LISTED by Und. Lab. Inc. to U.S. and Canadian safety standards
    IEC 61010-1, EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1.
    ELECTROMAGNETIC COMPATIBILITY
    Emissions and Immunity to EN 61326: Electrical Equipment for Measurement, Control and Laboratory use.

    Immunity to Industrial Locations:

Electrostatic discharge	EN 61000-4-2	Criterion A [2]
		4 kV contact discharge
		8 kV air discharge
Electromagnetic RF fields	EN 61000-4-3	Criterion A
		10 V/m
Fast transients (burst)	EN 61000-4-4	Criterion A
		2 kV power
		2 kV signal
Surge	EN 61000-4-5	Criterion A
		1kV L-L,2 kV L&N-E power
RF conducted interference	EN 61000-4-6	Criterion A
		3 V/rms

Emissions:

Emissions	EN 55011	Class A

Notes:
1. Criterion A: Normal operation within specified limits.
2. This device was designed for installation in an enclosure. To avoid electrostatic discharge to the unit in environments with static levels above 4 kV precautions should be taken when the device is mounted outside an enclosure. When working in an enclosure (ex. making adjustments, setting jumpers etc.) typical anti-static precautions should be observed before touching the unit.

11. **WEIGHT**: 15.1 oz (456.4 g)

> ⚠️ WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR AREA IS KNOWN TO BE NON-HAZARDOUS.

HARDWARE

INSTALLATION

DIN rail should be mounted horizontally so that the unit's ventilation holes are vertical in relation to cabinet orientation. A minimum clearance of 1 inch (25.4 mm) should be maintained above and below the unit in order to ensure proper thermal regulation.
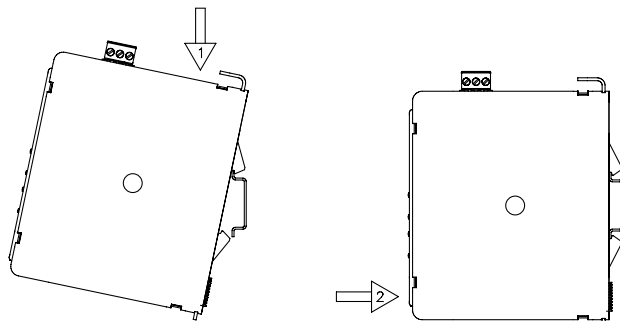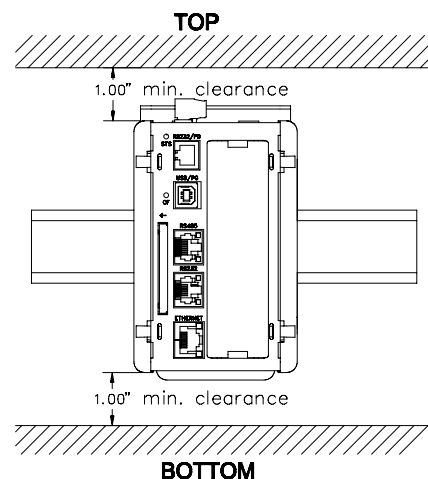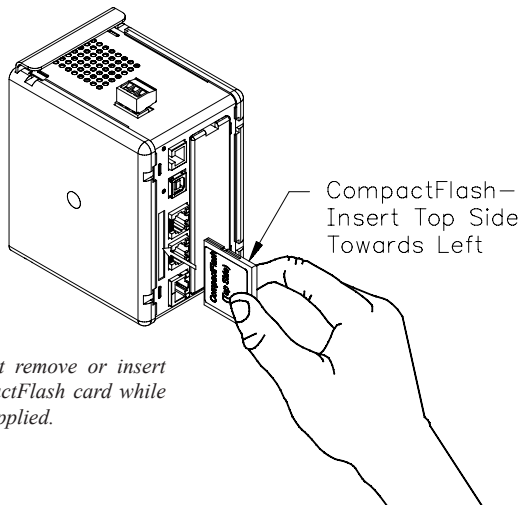
Figure 1 - Attach Data Station To DIN Rail

COMPACTFLASH® CARD

CompactFlash socket is a Type II socket that can accept either Type I or II cards. Use cards with a minimum of 4 Mbytes and a maximum of 2 Gbytes with the Data Station's CompactFlash socket. Cards are available at most computer and office supply retailers. CompactFlash can be used for configuration transfers, data logging, and trending.

CompactFlash—
Insert Top Side
Towards Left

Note: Do not remove or insert the CompactFlash card while power is applied.

Information stored on a CompactFlash card can be read by a card reader attached to a PC. This information is stored in IBM (Windows®) PC compatible FAT16 file format.

NOTE

For reliable operation in all of our products, Red Lion recommends the use of SanDisk® and SimpleTech brands of CompactFlash cards.

Industrial grade versions that provide up to two million write/erase cycles minimum are available from Red Lion.

POWER SUPPLY REQUIREMENTS

It is very important that the power supply is mounted correctly if the unit is to operate reliably. Please take care to observe the following points:

– The power supply must be mounted close to the unit, with usually not more than 6 feet (1.8 m) of cable between the supply and the Data Station. Ideally, the shortest length possible should be used.

– The wire used to connect the Data Station's power supply should be at least 22-gage wire. If a longer cable run is used, a heavier gage wire should be used. The routing of the cable should be kept away from large contactors, inverters, and other devices which may generate significant electrical noise.

– A power supply with a Class 2 or SELV rating is to be used. A Class 2 or SELV power supply provides isolation to accessible circuits from hazardous voltage levels generated by a mains power supply due to single faults. SELV is an acronym for "safety extra-low voltage." Safety extra-low voltage circuits shall exhibit voltages safe to touch both under normal operating conditions and after a single fault, such as a breakdown of a layer of basic insulation or after the failure of a single component has occurred.

Visit www.redlion.net for a complete list of our PSDR Series of Class 2 power supplies.

EMC INSTALLATION GUIDELINES

Although Red Lion Controls Products are designed with a high degree of immunity to Electromagnetic Interference (EMI), proper installation and wiring methods must be followed to ensure compatibility in each application. The type of the electrical noise, source or coupling method into a unit may be different for various installations. Cable length, routing, and shield termination are very important and can mean the difference between a successful or troublesome installation. Listed are some EMI guidelines for a successful installation in an industrial environment.

1. To reduce the chance of noise spikes entering the unit via the power lines, connections should be made to a clean source. Connecting to circuits that also power loads such as contactors, relays, motors, solenoids etc. should be avoided.
2. The unit should be mounted in a metal enclosure, which is properly connected to protective earth.
3. Use shielded (screened) cables for all Signal and Control inputs. The shield (screen) pigtail connection should be made as short as possible. The connection point for the shield depends somewhat upon the application. Listed below are the recommended methods of connecting the shield, in order of their effectiveness.
   a. Connect the shield to earth ground (protective earth) at one end where the unit is mounted.
   b. Connect the shield to earth ground at both ends of the cable, usually when the noise source frequency is over 1 MHz.
   c. Connect the shield to common of the Data Station and leave the other end of the shield unconnected and insulated from earth ground.

4. Never run Signal or Control cables in the same conduit or raceway with AC power lines, conductors feeding motors, solenoids, SCR controls, and heaters, etc. The cables should be run through metal conduit that is properly grounded. This is especially useful in applications where cable runs are long and portable two-way radios are used in close proximity or if the installation is near a commercial radio transmitter. Also, Signal or Control cables within an enclosure should be routed as far away as possible from contactors, control relays, transformers, and other noisy components.
5. Long cable runs are more susceptible to EMI pickup than short cable runs. Therefore, keep cable runs as short as possible.
6. In extremely high EMI environments, the use of external EMI suppression devices is effective. The following EMI suppression devices (or equivalent) are recommended:
   Ferrite Suppression Cores for signal and control cables:
   Fair-Rite part number 0443167251 (RLC part number FCOR0000)
   TDK part number ZCAT3035-1330A
   Steward part number 28B2029-0A0
   Line Filters for input power cables:
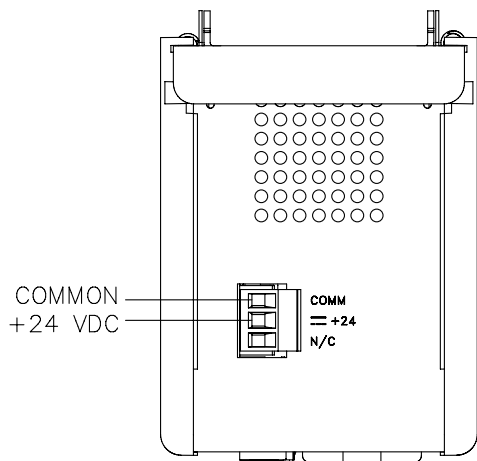   Schaffner part number FN610-1/07 (RLC part number LFIL0000)
   Schaffner part number FN670-1.8/07
   Corcom part number 1 VR3

Visit RLC's web site at www.redlion.net for more information on EMI guidelines, Safety and CE issues as they relate to Red Lion Controls products.
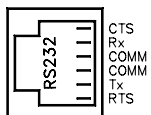
WIRING
POWER CONNECTION

COMMON
+24 VDC

COMM
+24
N/C

PROGRAMMING PORTS

RS232/PG

RS232

CTS
Rx
COMM
COMM
Tx
RTS

USB/PG

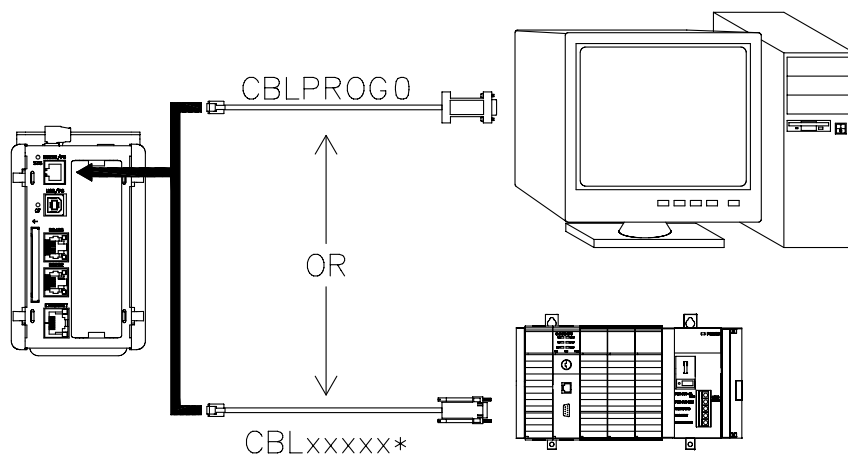**ETHERNET**

GREEN/AMBER LED

YELLOW LED

CBLPROG0

OR

CBLUSB00

OR

Ethernet (Crossover)

COMMUNICATION PORTS

RS232/PG

RS232

CTS
Rx
COMM
COMM
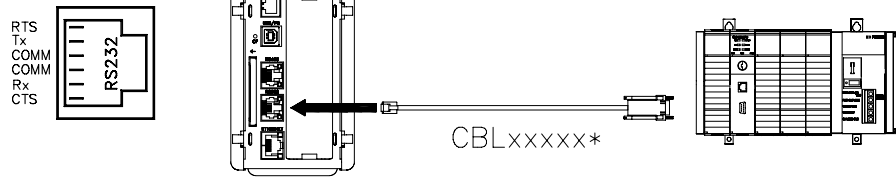Tx
RTS

CBLPROG0

OR

CBLxxxxx*

4

RS232

RTS
Tx
COMM
COMM
Rx
CTS

RS232

CBLxxxxx*
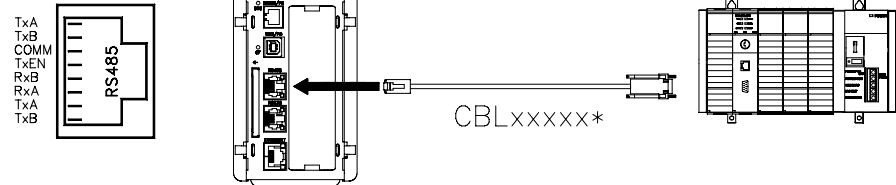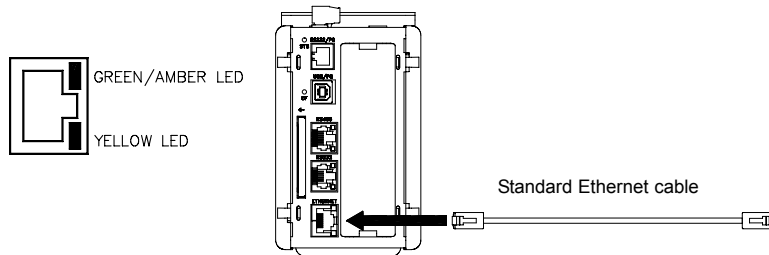
* Use appropriate communications cable. See Ordering Information for descriptions of the available cables.

RS485

TxA
TxB
COMM
TxEN
RxB
RxA
TxA
TxB

RS485

CBLxxxxx*

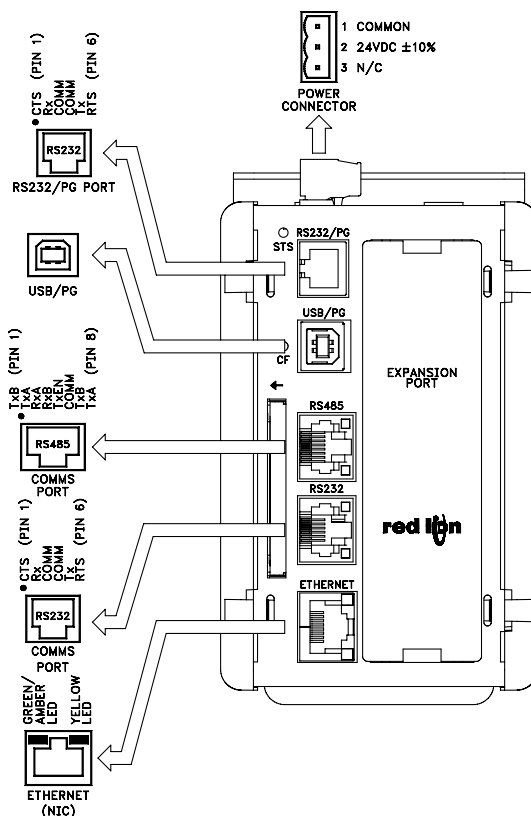**WARNING:** Do **NOT** use a standard DH-485 cable to connect this port to Allen Bradley equipment.

PORT 3 - ETHERNET CONNECTION

GREEN/AMBER LED

YELLOW LED

Standard Ethernet cable

DATA STATION PORT PIN OUTS

1 COMMON
2 24VDC ±10%
3 N/C

POWER CONNECTOR

CTS (PIN 1)
Rx
COMM
COMM
Tx
RTS (PIN 6)

RS232

RS232/PG PORT

USB/PG

TxB (PIN 1)
RxA
RxB
TxEN
COMM
TxA
TxB (PIN 8)

RS485

COMMS PORT

CTS (PIN 1)
Rx
COMM
COMM
Tx
RTS (PIN 6)

RS232

COMMS PORT

GREEN/AMBER LED
YELLOW LED

ETHERNET (NIC)

RS232/PG
STS

USB/PG

CF

EXPANSION PORT

RS485

RS232

red lion

ETHERNET

TROUBLESHOOTING

If for any reason you have trouble operating, connecting, or simply have questions concerning your new Data Station, contact Red Lion's technical support. For contact information, refer to the back page of this bulletin for phone and fax numbers.

EMAIL: techsupport@redlion.net
Web Site: http://www.redlion.net

COMMUNICATING WITH THE DATA STATION

CONFIGURING A DATA STATION

The Data Station is configured using Crimson® 2.0 software. Crimson 2.0 is available as a free download from Red Lion's website, or it can be ordered on CD. Updates to the software for new features and drivers are posted on the website as they become available. By configuring the Data Station using the latest version of the software, you are assured that your unit has the most up to date feature set. Crimson® 2.0 software can configure the Data Station through the RS232/PG port, USB/PG port, Ethernet, or CompactFlash. The USB/PG port is connected using a standard USB cable with a Type B connector.

The driver needed to use the USB port will be installed with Crimson 2.0. The RS232/PG port uses a programming cable made by Red Lion to connect to the DB9 COM port of your computer. If making your own cable, refer to the "Data Station Port Pin Outs" for wiring information.

The CompactFlash can be used to program a Data Station by placing a configuration file and firmware on the CompactFlash card. The card is then inserted into the target Data Station and powered. Refer to the Crimson® 2.0 literature for more information on the proper names and locations of the files.

CABLES AND DRIVERS

Red Lion has a wide range of cables and drivers for use with many different communication types. A list of these drivers and cables along with pin outs is available from Red Lion's website. New cables and drivers are added on a regular basis. If making your own cable, refer to the "Data Station Port Pin Outs" for wiring information.

USB, DATA TRANSFERS FROM THE COMPACTFLASH CARD

⚠️ WARNING - DO NOT CONNECT OR DISCONNECT CABLES WHILE POWER IS APPLIED UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS. USB PORT IS FOR SYSTEM SET-UP AND DIAGNOSTICS AND IS NOT INTENDED FOR PERMANENT CONNECTION.

In order to transfer data from the CompactFlash card via the USB port, a driver must be installed on your computer. This driver is installed with Crimson 2.0 and is located in the folder C:\Program Files\Red Lion Controls\Crimson 2.0\Device\ after Crimson 2.0 is installed. This may have already been accomplished if your Data Station was configured using the USB port.

Once the driver is installed, connect the Data Station to your PC with a USB cable, and follow "Mounting the CompactFlash" instructions in the Crimson 2.0 user manual.

Note that using the USB port for frequent data transfers is not recommended. For frequent data transfers it is recommended that the Ethernet connection be used. Through the Ethernet connection a web page can be set up to view logged data. Refer to the Crimson 2.0 manual for details.

Note: The USB port is for system set-up and diagnostics and is not intended for permanent connection.

ETHERNET COMMUNICATIONS

Ethernet communications can be established at either 10 BASE-T or 100 BASE-TX. The Data Station's RJ45 jack is wired as a NIC (Network Interface Card). For example, when wiring to a hub or switch use a straight-through cable, but when connecting to another NIC use a crossover cable.
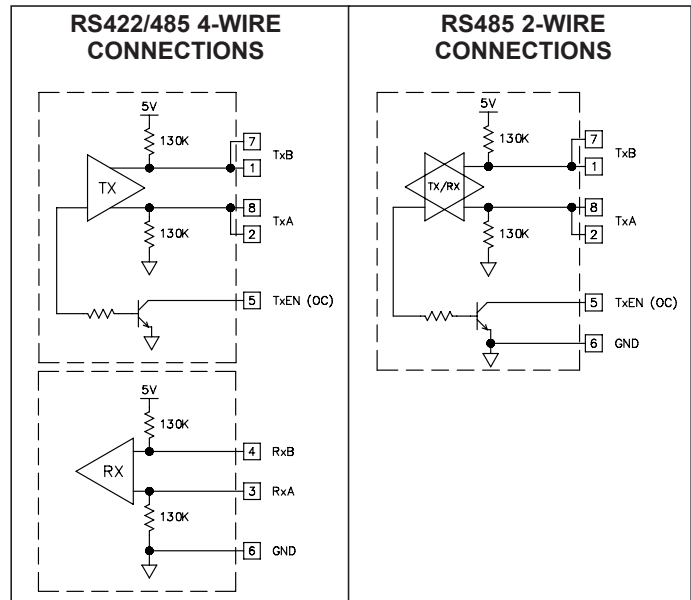
The Crimson 2.0 manual contains additional information on Ethernet communications.

RS232 PORTS

The Data Station has two RS232 ports. There is the RS232/PG port and the COMMS port. Although only one of these ports can be used for programming, both ports can be used for communications with a PLC. The RS232/PG port can be used for either master or slave protocols.

RS422/485 PORT

The Data Station has one RS422/485 port. This port can be configured to act as either RS422 or RS485.

Note: All Red Lion® devices connect A to A and B to B, except for Paradigm devices. Refer to www.redlion.net for additional information.

DH485 COMMUNICATIONS

The Data Station's RS422/485 COMMS port can also be used for Allen Bradley DH485 communications.

WARNING: DO NOT use a standard DH485 cable to connect this port to Allen Bradley equipment. A cable and wiring diagram are available from Red Lion.

LEDS

STS – STATUS LED

The green Status LED provides information regarding the state of the Data Station. This includes indication of the various stages of the start-up routine (power-up), and any errors that may occur.

Startup Routine

	INDICATION
Rapidly Flashing	Data Station is currently running the boot loader and/or being flash upgraded by Crimson.
Steady	Data Station is operating properly.

CF – COMPACTFLASH LED

LED	INDICATION
Off	No CompactFlash Card is present.
Steady	Valid CompactFlash card is present.
Flashing Rapidly	CompactFlash card is being checked.
Flickering	Unit is writing to the CompactFlash, either because it is storing data, or because the PC connected via the USB port has locked the drive. [1]
Flashing Slowly	Incorrectly formatted CompactFlash card present.

1. Do not turn off power to the unit while this light is flickering. The unit writes data in two minute intervals. Later Microsoft operating systems will not lock the drive unless they need to write data; Windows 98 may lock the drive any time it is mounted, thereby interfering with logging. Refer to "Mounting the CompactFlash" in the Crimson 2.0 User Manual.

USER COMMUNICATION PORTS - TX/RX LEDS

LED	INDICATION
GREEN	Transmitting
RED	Receiving

Note: LEDs are not available on the Programming Port: RS232/PG.

ETHERNET LEDS

LED	INDICATION
YELLOW (Solid)	Link Established
YELLOW (Flashing)	Network Activity
GREEN	10 BASE-T Communications
AMBER	100 BASE-TX Communications

ORDERING INFORMATION

TYPE	MODEL NO.	DESCRIPTION	PART NUMBER
Data Station Plus	DSP	Data Station with multiple protocol converter, data logger, web server with Virtual HMI up to QVGA (320 x 240) and expansion slot.	DSPSX000
		Data Station with multiple protocol converter, data logger, web server with Virtual HMI up to VGA (640 x 480) size and expansion slot with increased SDRAM.	DSPGT000
Communications Cables (10 feet)	CBL	RS-232 Programming Cable	CBLPROG0
		USB Cable	CBLUSB00
		Communications Cables [1]	CBLxxxxx
Software	SFCRM2	Crimson® 2.0 [2], Manual and Download Cable	SFCRM200
Power Supply	PSDR	DIN Rail Power Supply	PSDRxxxx
Accessories	XCCN	CANopen option card for Modular Controller or Data Station Plus	XCCN0000
	XCDN	DeviceNet option card for Modular Controller or Data Station Plus	XCDN0000
	XCPB	PROFIBUS option card for Modular Controller or Data Station Plus	XCPBDP00
	XCRS	RS232/485 option card for Modular Controller or Data Station Plus	XCRS0000
	G3CF	64 MB CompactFlash Card [4]	G3CF064M
		256 MB CompactFlash Card [4]	G3CF256M
		512 MB CompactFlash Card [4]	G3CF512M
	DR	DIN Rail Mountable Adapter Products [3]	DRxxxxxx

[1] Visit www.redlion.net for a list of communication drivers and cables.

[2] Use this part number to purchase the Crimson® software on CD with a printed manual, USB cable, and RS-232 cable. Otherwise, download free of charge from www.redlion.net.

[3] Red Lion offers RJ modular jack adapters. Refer to the DR literature for complete details.

[4] Industrial grade two million write cycles.

LIMITED WARRANTY

The Company warrants the products it manufactures against defects in materials and workmanship for a period limited to two years from the date of shipment, provided the products have been stored, handled, installed, and used under proper conditions. The Company's liability under this limited warranty shall extend only to the repair or replacement of a defective product, at The Company's option. The Company disclaims all liability for any affirmation, promise or representation with respect to the products.

The customer agrees to hold Red Lion Controls harmless from, defend, and indemnify RLC against damages, claims, and expenses arising out of subsequent sales of RLC products or products containing components manufactured by RLC and based upon personal injuries, deaths, property damage, lost profits, and other matters which Buyer, its employees, or sub-contractors are or may be to any extent liable, including without limitation penalties imposed by the Consumer Product Safety Act (P.L. 92-573) and liability imposed upon any person pursuant to the Magnuson-Moss Warranty Act (P.L. 93-637), as now in effect or as amended hereafter.

No warranties expressed or implied are created with respect to The Company's products except those expressly contained herein. The Customer acknowledges the disclaimers and limitations contained herein and relies on no other warranties or affirmations.

red lion

Tel +1 (717) 767-6511
Fax +1 (717) 764-0839
www.redlion.net

SWITCH08 - DIN RAIL MOUNTED 8 PORT ETHERNET SWITCH
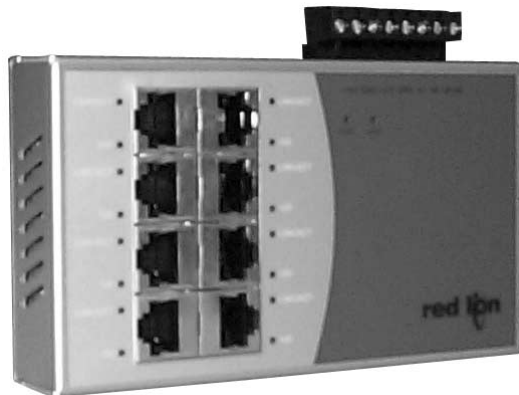
- *UNMANAGED SWITCH REQUIRES NO CONFIGURATION*
- *SUPPORTS 10/100 MDPS NETWORK*
- *AUTO HALF/FULL DUPLEX NEGOTIATION*
- *AUTO-CROSSING DETECTION SUPPORTS STANDARD AND CROSSOVER ETHERNET CABLES*

UL Recognized Component, File # E244362

DESCRIPTION

The SWITCH08 is an eight-port Ethernet switch designed to simplify network expansion, while improving the network's efficiency. Eight 10/100 Base-T ports, with auto negotiation of half or full duplex connections requires no setup, reducing installation time. The SWITCH08 also offers an auto-crossing feature, which allows connections to be made with any combination of standard or crossover Ethernet cables.

The SWITCH08 may be powered with two DC sources, allowing for redundancy in critical applications. A relay output provides a warning signal if the backup supply fails, ensuring continued operation when needed.

SAFETY SUMMARY

All safety related regulations, local codes and instructions that appear in the literature or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

⚠️ **CAUTION: Read complete instructions prior to installation and operation of the unit.**

DIMENSIONS In inches (mm)

5.275 (133.99)

1.10 (27.9)

3.135 (79.6)   3.95 (100.3)

1.36 (34.5)
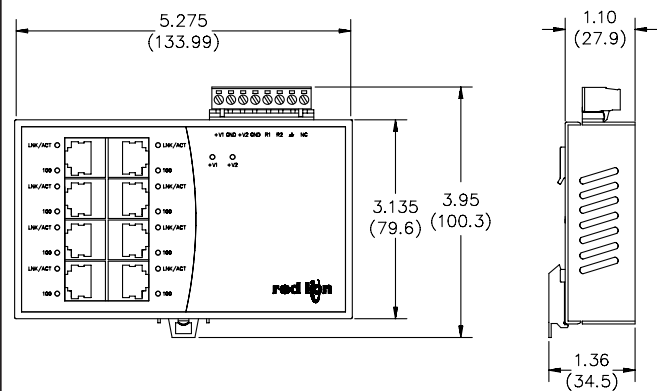
ORDERING INFORMATION

MODEL NO.	DESCRIPTION	PART NUMBER
SWITCH	8-Port Ethernet Switch	SWITCH08

1

SPECIFICATIONS

1. **POWER**: 24 VDC ±20 %, 4.8 W
2. **RELAY OUTPUT**: Single N.C. 24 VDC @ 100 mA max.
3. **LEDs**:
   V1+ and V2+ - On when proper voltage is present at respective terminal
   Link/Act - On indicates link established; blinking indicates network activity on the port.
   100 - On indicates 100 Mbps connection established; off indicates 10 Mbps connection.
4. **ENVIRONMENTAL CONDITIONS**:
   Operating Temperature Range: 0 to +55°C
   Storage Temperature Range: -20 to +70°C
   Operating and Storage Humidity: 30-95%, non-condensing
   Altitude: Up to 1500 meters
5. **CONSTRUCTION**: Brushed aluminum housing.
6. **CONNECTIONS**:
   POWER: Removable wire clamp screw terminal block.
   Wire Gage Capacity: 24 AWG to 12 AWG
   Torque: 4.45 to 5.34 in/lb (0.5 to 0.6 N-m)
   ETHERNET: 8-position RJ-45 female connector
7. **MOUNTING**: Snaps onto standard DIN style top hat (T) profile mounting rails according to EN50022 -35 x 7.5 and -35 x 15.

8. **CERTIFICATIONS AND COMPLIANCES**:

Immunity to Industrial Locations:

Electrostatic discharge	EN 61000-4-2	Criterion B
Electromagnetic RF fields	EN 61000-4-3	Criterion A
Fast transients (burst)	EN 61000-4-4	Criterion A
Surge	EN 61000-4-5	Criterion B
RF conducted interference	EN 61000-4-6	Criterion A
Magnetic interference	EN 61000-4-8	Criterion A
Emissions	EN 55022	Class A

Mechanical:

Shock	IEC 60068-2-27
	Operation: 25g, 11 msec period, half-sine shock pulse
	Storage: 50g, 11 msec period, half-sine shock pulse
Vibration	IEC 60068-2-6
	Operation/Storage: 5g, 150 Hz Criterion 3
Fall	IEC 60068-2-32
	3.281 ft (1 m)

9. **WEIGHT**: 0.61 lbs. (0.27 Kg)

POWER

The SWITCH08 can be powered in various configurations with either one or two +24 VDC SELV power supplies. How it is wired depends on whether or not a backup power supply is desired for failsafe operation. (For example, if the relay isn't used, a single power supply may be connected to +V1 only.)
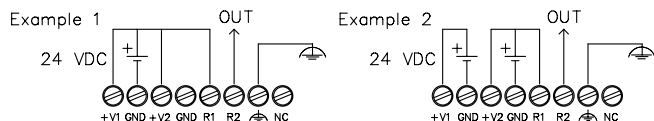
⚠ **NOTE: MUST USE SELV POWER SUPPLIES**

RELAY OUTPUT

The N.C. relay output remains closed as long as the proper voltage is present at both +V1 and +V2 terminals. In the event of a voltage failure at one of the terminals, the contact is opened. This may be used to signal other systems that one of the power supplies has failed.

MOUNTING

Mount the SWITCH08 to a grounded standard DIN rail. The switch will be grounded once it is snapped onto the rail. Additionally the noise immunity can be improved in environments with high electromagnetic smog by a low-impedance connection to the functional earth through terminal 7.

⚠ **NOTE: The SWITCH08 module was designed for use with SELV in accordance with IEC 950 / EN 60950 / VDE 0805**

TROUBLESHOOTING

For further technical assistance, contact technical support at the appropriate company numbers listed.

red lion

Tel +1 (717) 767-6511
Fax +1 (717) 764-0839
www.redlion.net

MODEL XCPB - PROFIBUS OPTION CARD FOR DATA STATION PLUS AND MODULAR CONTROLLER

- *ADDS PROFIBUS DP CONNECTIVITY TO THE DATA STATION PLUS AND MODULAR CONTROLLER SERIES*
- *PROFIBUS DP SLAVE PROTOCOL*
- *EASY INSTALLATION*

GENERAL DESCRIPTION

Both the Modular Controller Master (enhanced models) and Data Station Plus contain a proprietary expansion port which provides a high speed, parallel architecture that extends the functionality and flexibility of the platform. This approach allows these products to evolve concurrently with the latest advances in communications and standards, without sacrificing performance. This high bandwidth channel has significantly greater throughput when compared to the traditional (external) serial gateway approach.

The XCPB option card adds PROFIBUS DP connectivity to the series. This allows a high-speed exchange of blocks of data, at data rates up to 12MBaud, between the hosting Modular Controller or Data Station and a Master PLC or PC on a PROFIBUS network. The DP suffix refers to "Decentralized Periphery", which is used to describe distributed I/O devices connected via a fast serial data link with a central controller.

The XCPB communication card is easily installed by removing the blank expansion port cover of your Modular Controller or Data Station Plus, and plugging the XCPB card into the expansion port. Configuration is simple using Red Lion's free Crimson 2.0 software.

SAFETY SUMMARY

All safety related regulations, local codes and instructions that appear in the literature or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Do not use the controller to directly command motors, valves, or other actuators not equipped with safeguards. To do so can be potentially harmful to persons or equipment in the event of a fault to the controller.

> ⚠ **CAUTION: Risk of Danger.**
> Read complete instructions prior to installation and operation of the unit.

ORDERING INFORMATION

MODEL NO.	DESCRIPTION	PART NUMBER
XCPB	PROFIBUS option card for Modular Controller or Data Station Plus	XCPBDP00
SFCRM2	Crimson 2.0 with G3/Data Station Manual[1]	SFCRM200
SFCRM2	Crimson 2.0 with Modular Controller Manual[1]	SFCRM2MC

[1] *Use these part numbers to purchase Crimson 2.0 on CD with a printed manual, USB cable and RS-232 cable. Otherwise, download free of charge from www.redlion.net.*

CONTENTS OF PACKAGE

- XCPB option card
- This hardware bulletin

GSD FILE

The GSD file and associated bitmap are part of the Crimson 2.0 installation. After installing Crimson 2.0, both files can be found on your PC's hard drive at C:\Program Files\Red Lion Controls\Crimson 2.0\Firmware, or on our website at http://www.redlion.net

SPECIFICATIONS

1. **POWER REQUIREMENTS:** Power is supplied to the option card from the main board of the Modular Controller Master or Data Station Plus.
2. **COMMUNICATIONS:**
   PROFIBUS Port: FIELDBUS Type : PROFIBUS-DP EN 50 170, I. The PROFIBUS port has autobaud detect up to 12M baud and is digitally isolated.
3. **CERTIFICATIONS AND COMPLIANCES:**
   Refer to main unit manual or "Agency Approvals" section of Red Lion's website for agency certifications.
   ELECTROMAGNETIC COMPATIBILITY
   Emissions and Immunity to EN 61326: Electrical Equipment for Measurement, Control and Laboratory use.
   Reference Modular Controller Master or Data Station Plus unit for EMC specifications
4. **ENVIRONMENTAL CONDITIONS:**
   Operating Temperature Range: 0 to 50°C
   Storage Temperature Range: -20 to 80°C
   Operating and Storage Humidity: 80% maximum relative humidity (non-condensing) from 0 to 50°C.
   Altitude: Up to 2000 meters.
5. **CONSTRUCTION:** Installation Category I, Pollution Degree 2.
6. **INSTALLATION REQUIREMENTS:** See "Installing the XCPB Option card" for more details.

1

INSTALLING THE XCPB OPTION CARD

Caution: The expansion and main circuit boards contain static sensitive components. Before handling the cards, discharge static charges from your body by touching a grounded bare metal object. Ideally, handle the cards at a static controlled clean workstation. Also, handle the cards by the edges only. Dirt, oil, or other contaminants that may contact the cards can adversely affect circuit operation.

Warning: Risk of Danger: Be sure to remove all power before removing the expansion port cover

1. Remove power from the unit
2. Insert a flat-bladed screwdriver into the slot at the top of the expansion port cover. Gently apply pressure on the screwdriver in an upward direction until the expansion port cover disengages from the unit as shown in Figure 1.
3. Verify that the option card knobs are in the "unlocked" position as shown in Figure 2.
4. Carefully insert the option card into the expansion port opening while aligning the card-edge connector on the option card with the main board's header, as shown in Figure 3. Once aligned, gently press on the front of the card until it is flush with the front of the case.
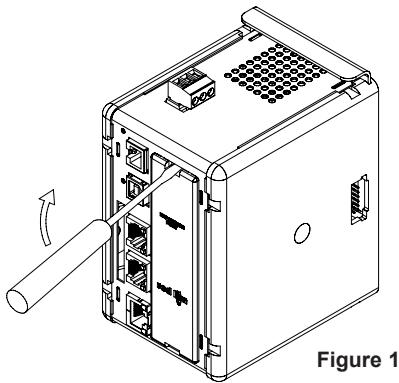5. Turn the option card knobs to the locked position as shown in Figure 4.
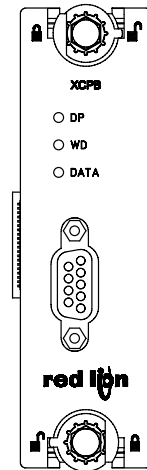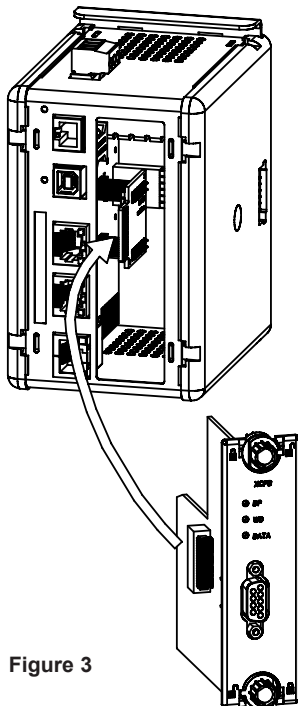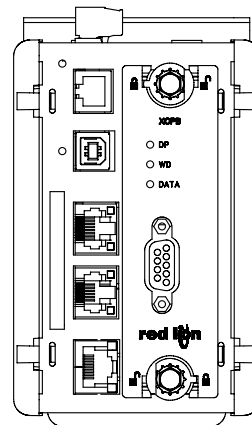
Figure 1

Figure 2

Figure 3

Figure 4

POWER SUPPLY REQUIREMENTS
NEW AND EXISTING INSTALLATIONS

The XCPB option card draws all of its power from the main board of the Modular Controller master or Data Station Plus. The specifications of the Modular Controller master or Data Station Plus account for the power needs of an option card.

COMMUNICATING WITH THE XCPB OPTION CARD
CONFIGURING THE XCPB OPTION CARD

To enable the option card, click on the left hand pane of the Communications window in Crimson 2.0 and highlight the icon that represents the master or Data Station Plus. In the right pane, click the Option Card Selection's Edit button to show the selection dialog, and choose the PROFIBUS option card from the list. The PROFIBUS option card will then appear in the left hand pane, installed in the tree of available ports. Additional information can be found in your Modular Controller or Data Station Plus hardware bulletin and the Crimson 2.0 user manual.

CONFIGURING THE DRIVER

To select a driver, click on the left hand pane of the Communications window and highlight the PROFIBUS Interface icon. In the right hand pane, click the Driver Selection Edit button to show the Driver Selection dialog and select the PROFIBUS DP driver from the list.

The Station Address of the PROFIBUS node is the only property that needs to be configured. This should be a unique address on the PROFIBUS Network in the range 0..126.

CONFIGURING THE DATA TAGS

A PROFIBUS master exchanges data with slaves as separate input and output blocks. Data transfer direction is described with respect to the PROFIBUS Network such that input data is transferred to the network, or written by the Modular Controller/Data Station Plus and output data is transferred from the network or read by the Modular Controller/Data Station Plus. This is important when it comes to configuring the data access for each tag mapped to a PROFIBUS data block.

MAPPING TAGS TO PROFIBUS

PROFIBUS data blocks have no concept or knowledge of data type or structure – they are described by a size in bytes. Crimson's tag-based approach to data allows for data of mixed type, bytes, 16-bit words, 32-bit words and 32-bit floating point numbers to be mapped into a single data block. To map a data tag to a PROFIBUS data block, click in the left hand pane of the Data Tags window, highlight the required Data Tag icon. In the right hand pane click the Data Mapping button and select the PROFIBUS device to show the Select Address for PROFIBUS DP dialog.

The Block Type defines whether the tag will be read from (Output Block) or written to (Input Block) the PROFIBUS network

The Data Offset is the byte address of the Data Tag within the Data Block

The Data Type is the actual size in bytes of the data that will be mapped into the Data Block.

> ⚠ **CONFIGURING DATA ACCESS IN CRIMSON 2.0**
> As described, Data Tags are mapped to either an Input Block and are **Write only**, or an Output Block and are **Read Only**. The Access must be selected to reflect this.

SOFTWARE/UNIT OPERATION
LEDS

The card has 3 LEDs visible on the front of the option card that provide status information, described in Table 1.

DATA (Red)	WD (Green)	DP (Red)	DESCRIPTION
OFF	SLOW ALTERNATING FLASH		Baud Search
OFF	OFF	ON	Baud Control
OFF	SLOW FLASH	FAST FLASH	Waiting for Parameter Telegram
OFF	FAST FLASH	SLOW FLASH	Waiting for Configuration Telegram
ON	OFF	OFF	Data Exchange

CRIMSON SOFTWARE

Crimson 2.0 software is available as a free download from www.redlion.net or it can be purchased on a CD, see "Ordering Information" for part number. The latest version of the software is always available from the web site, and updating your copy is free.

TROUBLESHOOTING YOUR XCPB OPTION CARD

If for any reason you have trouble operating, connecting, or simply have questions concerning your new XCPB option card, contact Red Lion's technical support. For contact information, refer to the back page of this bulletin for phone and fax numbers.

EMAIL: techsupport@redlion.net
Web Site: http://www.redlion.net

LIMITED WARRANTY

The Company warrants the products it manufactures against defects in materials and workmanship for a period limited to two years from the date of shipment, provided the products have been stored, handled, installed, and used under proper conditions. The Company's liability under this limited warranty shall extend only to the repair or replacement of a defective product, at The Company's option. The Company disclaims all liability for any affirmation, promise or representation with respect to the products.

The customer agrees to hold Red Lion Controls harmless from, defend, and indemnify RLC against damages, claims, and expenses arising out of subsequent sales of RLC products or products containing components manufactured by RLC and based upon personal injuries, deaths, property damage, lost profits, and other matters which Buyer, its employees, or sub-contractors are or may be to any extent liable, including without limitation penalties imposed by the Consumer Product Safety Act (P.L. 92-573) and liability imposed upon any person pursuant to the Magnuson-Moss Warranty Act (P.L. 93-637), as now in effect or as amended hereafter.

No warranties expressed or implied are created with respect to The Company's products except those expressly contained herein. The Customer acknowledges the disclaimers and limitations contained herein and relies on no other warranties or affirmations.

red lion

Tel +1 (717) 767-6511
Fax +1 (717) 764-0839
www.redlion.net

MODEL XCRS - RS232/485 OPTION CARD FOR DATA STATION PLUS AND MODULAR CONTROLLER

- *CONFIGURED USING CRIMSON SOFTWARE (VERSION 2.0 OR LATER)*
- *ISOLATED RS232 AND RS485 MULTIPLEXED PORTS CAPABLE OF COMMUNICATING WITH RS232, RS422, RS485 AND DH485 DEVICES AT UP TO 115,200 BAUD*
- *EASY INSTALLATION*

GENERAL DESCRIPTION

Both the Modular Controller Master (enhanced models) and Data Station Plus contain a proprietary expansion port which provides a high speed, parallel architecture that extends the functionality and flexibility of the platform. This approach allows these products to evolve concurrently with the latest advances in communications and standards, without sacrificing performance. This high bandwidth channel has significantly greater throughput when compared to the traditional (external) serial gateway approach.

The XCRS option card adds an additional RS232 and RS422/485 port to the series. This isolated card protects user equipment from potentially harmful ground loops while providing high-speed RS232, RS422, RS485, and DH485 communication options to the end user.

The XCRS communication card is easily installed by removing the blank expansion port cover of your Modular Controller or Data Station Plus, and plugging the XCRS card into the expansion port. Configuration is simple using Red Lion's free Crimson 2.0 software.

SAFETY SUMMARY

All safety related regulations, local codes and instructions that appear in the literature or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Do not use the controller to directly command motors, valves, or other actuators not equipped with safeguards. To do so can be potentially harmful to persons or equipment in the event of a fault to the controller.

> ⚠ **CAUTION: Risk of Danger.**
> Read complete instructions prior to installation and operation of the unit.

CONTENTS OF PACKAGE

- XCRS option card
- This hardware bulletin

ORDERING INFORMATION

MODEL NO.	DESCRIPTION	PART NUMBER
XCRS	RS232/485 option card for Modular Controller or Data Station Plus	XCRS0000
CBL	Communication Cables [1]	CBLxxxxx
DR	DIN Rail Mountable Adapter Products [2]	DRxxxxxx
SFCRM2	Crimson 2.0 with G3/Data Station Manual [3]	SFCRM200
SFCRM2	Crimson 2.0 with Modular Controller Manual [3]	SFCRM2MC

[1] Contact your Red Lion distributor or visit www.redlion.net for complete selection.

[2] Red Lion offers RJ modular jack adapters. Refer to DR literature for complete details.

[3] Use these part numbers to purchase Crimson 2.0 on CD with a printed manual, USB cable and RS-232 cable. Otherwise, download free of charge from www.redlion.net.

SPECIFICATIONS

1. **POWER REQUIREMENTS:** Power is supplied to the option card from the main board of the Modular Controller Master or Data Station Plus.

2. **COMMUNICATIONS:**

   Serial Ports: Format and Baud Rates for each port are individually software programmable up to 115,200 baud and are isolated to help prevent ground loops. The RS422/485 and DH485 port via RJ45 and the RS232 port via RJ12 share the same hardware. The XCRS option card multiplexes the ports to communicate via two protocols. These ports may be used to configure different master protocols, but only one port may be used if configuring a slave protocol or AB DH485.

   DH485 TXEN: Transmit enable; open collector, $V_{OH} = 15$ VDC, $V_{OL} = 0.5$ VDC **Isolation from XCRS Communication ports to the Modular Controller Master or Data Station Plus:** 1000 VDC for 1 minute.

3. **CERTIFICATIONS AND COMPLIANCES:**

   Refer to main unit manual or "Agency Approvals" section of Red Lion's website for agency certifications.

   ELECTROMAGNETIC COMPATIBILITY

   Emissions and Immunity to EN 61326: Electrical Equipment for Measurement, Control and Laboratory use.

   Reference Modular Controller Master or Data Station Plus unit for EMC specifications

4. **ENVIRONMENTAL CONDITIONS:**
   Operating Temperature Range: 0 to 50°C
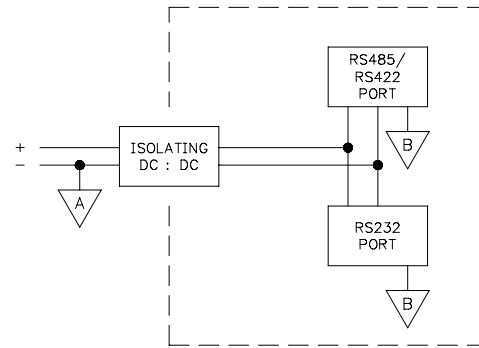   Storage Temperature Range: -20 to 80°C
   Operating and Storage Humidity: 80% maximum relative humidity (non-condensing) from 0 to 50°C.
   Altitude: Up to 2000 meters.
5. **CONSTRUCTION:** Installation Category I, Pollution Degree 2.
6. **INSTALLATION REQUIREMENTS:** See "Installing the XCRS Option card" for more details.

BLOCK DIAGRAM

INSTALLING THE XCRS OPTION CARD

1. Remove power from the unit
2. Insert a flat-bladed screwdriver into the slot at the top of the expansion port cover. Gently apply pressure on the screwdriver in an upward direction until the expansion port cover disengages from the unit as shown in Figure 1.
3. Verify that the option card knobs are in the "unlocked" position as shown in Figure 2.
4. Carefully insert the option card into the expansion port opening while aligning the card-edge connector on the option card with the main board's header, as shown in Figure 3. Once aligned, gently press on the front of the card until it is flush with the front of the case.
5. Turn the option card knobs to the locked position as shown in Figure 4.

Caution: The expansion and main circuit boards contain static sensitive components. Before handling the cards, discharge static charges from your body by touching a grounded bare metal object. Ideally, handle the cards at a static controlled clean workstation. Also, handle the cards by the edges only. Dirt, oil, or other contaminants that may contact the cards can adversely affect circuit operation.

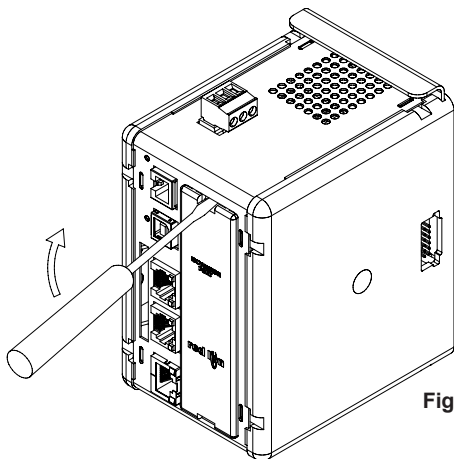**Warning: Risk of Danger:** Be sure to remove all power before removing the expansion port cover
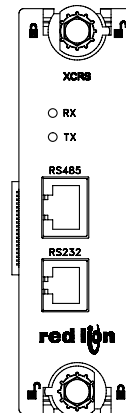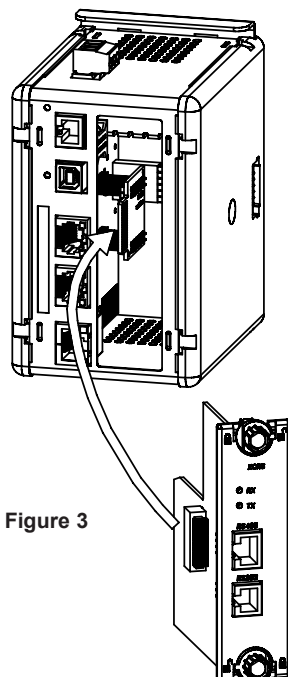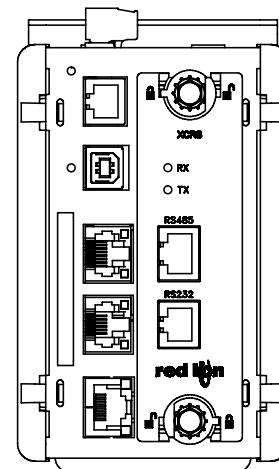

Figure 1

Figure 2

Figure 3

Figure 4

POWER SUPPLY REQUIREMENTS
NEW AND EXISTING INSTALLATIONS

The XCRS option card draws all of its power from the main board of the Modular Controller Master or Data Station Plus. The specifications of the Modular Controller Master or Data Station Plus account for the power needs of an option card.

COMMUNICATING WITH THE XCRS OPTION CARD
CONFIGURING A XCRS OPTION CARD

The XCRS is configured using Crimson software. Crimson is available as a free download from www.redlion.net, or it can be ordered on CD. Updates to Crimson for new features and drivers are posted on the website as they become available. By configuring the XCRS using the latest version of Crimson, you are assured that your unit has the most up-to-date feature set. Crimson software can configure the XCRS through the RS232 PGM port, USB port, Ethernet port, or CompactFlash socket on your Modular Controller Master or Data Station Plus. Additional information can be found in your Modular Controller Master or Data Station Plus hardware bulletin and the Crimson user manual.

CABLES AND DRIVERS

Red Lion has a wide range of cables and drivers for use with many different communication types. A list of these drivers and cables along with pin outs is available from www.redlion.net. New cables and drivers are added on a regular basis. If making your own cable, refer to the "XCRS Port Pin Outs" for wiring information.

RS232 PORTS

The XCRS option card has one RS232 port. The port can be used for either master or slave protocols with any Modular Controller Master or Data Station Plus configuration. The RS232 port and RS422/485 port on the XCRS option card are multiplexed because they share the same hardware. Both ports can be used with master protocols. However, when the RS232 port is used with a slave protocol, the RS422/485 port is not available. For examples of RS232 communications refer to your Modular Controller Master or Data Station Plus literature.

RS422/485 COMMS PORT

The XCRS option card has one RS422/485 port. This port can be configured to act as either RS422 or RS485.

The RS422/485 port and RS232 port are multiplexed because they share the same hardware. Both ports can be used with master protocols. However, when the RS422/485 port is used with a slave protocol, the RS232 port is not available.
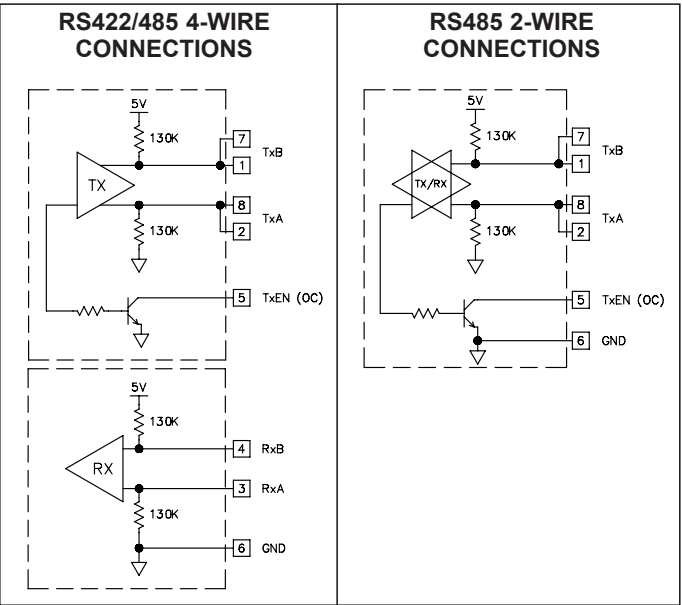
RS422/485 4-WIRE CONNECTIONS   **RS485 2-WIRE CONNECTIONS**

Note: All Red Lion devices connect A to A and B to B, except for Paradigm devices. Refer to www.redlion.net for additional information.

For examples of RS422/485 communications refer to your Modular Controller Master or Data Station Plus literature.

DH485 COMMUNICATIONS

The XCRS option card's RS422/485 port can also be used for Allen Bradley DH485 communications. When this port is configured to communicate DH485, the RS232 port can not be used because the ports share the same hardware and the XCRS option card multiplexes the ports to communicate via two protocols.

WARNING: DO NOT use a standard DH485 cable to connect this port to Allen Bradley equipment doing so may cause irreparable damage to the equipment connected. A cable and wiring diagram are available from Red Lion.

Modular Controller Master or Data Station Plus to AB SLC 500 (CBLAB003)

Connections			
RJ45: RLC	Name	RJ45: A-B	Name
1	TxB	1	A
2	TxA	2	B
3, 8	RxA	-	24V
4, 7	RxB	-	COMM
5	TxEN	5	TxEN
6	COMM	4	SHIELD
4, 7	TxB	-	COMM
3, 8	TxA	-	24V

SOFTWARE/UNIT OPERATIONS
XCRS PORT PIN OUTS
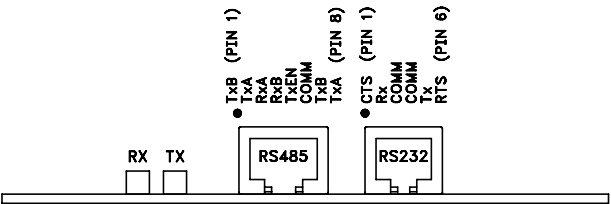
LEDS

The transmit LED(TX) will flash when information is transmitted from the XCRS card. The receive LED(RX) will flash when information is received.

CRIMSON SOFTWARE

Crimson 2.0 software is available as a free download from www.redlion.net or it can be purchased on a CD, see "Ordering Information" for part number. The latest version of the software is always available from the web site, and updating your copy is free.

TROUBLESHOOTING YOUR XCRS OPTION CARD

If for any reason you have trouble operating, connecting, or simply have questions concerning your new XCRS option card, contact Red Lion's technical support. For contact information, refer to the back page of this bulletin for phone and fax numbers.

EMAIL: techsupport@redlion.net
Web Site: http://www.redlion.net

LIMITED WARRANTY

The Company warrants the products it manufactures against defects in materials and workmanship for a period limited to two years from the date of shipment, provided the products have been stored, handled, installed, and used under proper conditions. The Company's liability under this limited warranty shall extend only to the repair or replacement of a defective product, at The Company's option. The Company disclaims all liability for any affirmation, promise or representation with respect to the products.

The customer agrees to hold Red Lion Controls harmless from, defend, and indemnify RLC against damages, claims, and expenses arising out of subsequent sales of RLC products or products containing components manufactured by RLC and based upon personal injuries, deaths, property damage, lost profits, and other matters which Buyer, its employees, or sub-contractors are or may be to any extent liable, including without limitation penalties imposed by the Consumer Product Safety Act (P.L. 92-573) and liability imposed upon any person pursuant to the Magnuson-Moss Warranty Act (P.L. 93-637), as now in effect or as amended hereafter.

No warranties expressed or implied are created with respect to The Company's products except those expressly contained herein. The Customer acknowledges the disclaimers and limitations contained herein and relies on no other warranties or affirmations.

MODEL XCDN - DeviceNet OPTION CARD FOR DATA STATION PLUS AND MODULAR CONTROLLER

- CONFIGURED USING CRIMSON SOFTWARE (VERSION 2.0 OR LATER)
- DIGITALLY ISOLATED DeviceNet PORT CAPABLE OF COMMUNICATING WITH ANY DeviceNet MASTER
- EASY INSTALLATION

GENERAL DESCRIPTION

Both the Modular Controller Master (enhanced models) and Data Station Plus contain a proprietary expansion port which provides a high speed, parallel architecture that extends the functionality and flexibility of the platform. This approach allows these products to evolve concurrently with the latest advances in communications and standards, without sacrificing performance. This high bandwidth channel has significantly greater throughput when compared to the traditional (external) serial gateway approach.

The XCDN option card adds a DeviceNet slave communication port to the series. This isolated card protects user equipment from potentially harmful ground loops while providing the ability to communicate to any high speed DeviceNet master. Additionally, the XCDN connector is pluggable for easy removal of the Modular Controller Master or Data Station Plus from the DeviceNet bus without disturbing communications with other devices on the bus.

The XCDN communication card is easily installed by removing the blank expansion port cover of your Modular Controller or Data Station Plus, and plugging the XCDN card into the expansion port. Configuration is simple using Red Lion's free Crimson 2.0 software.

SAFETY SUMMARY

All safety related regulations, local codes and instructions that appear in the literature or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Do not use the controller to directly command motors, valves, or other actuators not equipped with safeguards. To do so can be potentially harmful to persons or equipment in the event of a fault to the controller.

> **CAUTION: Risk of Danger.**
> Read complete instructions prior to installation and operation of the unit.

ORDERING INFORMATION

MODEL NO.	DESCRIPTION	PART NUMBER
XCDN	DeviceNet option card for Modular Controller or Data Station Plus	XCDN0000
SFCRM2	Crimson 2.0 with G3/Data Station Manual [1]	SFCRM200
SFCRM2	Crimson 2.0 with Modular Controller Manual [1]	SFCRM2MC

[1] Use these part numbers to purchase Crimson 2.0 on CD with a printed manual, USB cable and RS-232 cable. Otherwise, download free of charge from www.redlion.net.

CONTENTS OF PACKAGE

- XCDN option card
- This hardware bulletin

SPECIFICATIONS

1. **POWER REQUIREMENTS:** Power is supplied to the option card from the main board of the Modular Controller Master or Data Station Plus.
2. **COMMUNICATIONS:**
   DeviceNet Port: The DeviceNet port has format and baud rates that are software programmable up to 500K baud and are digitally isolated. This port may be configured for various DeviceNet protocols. Check www.redlion.net for currently supported protocols.
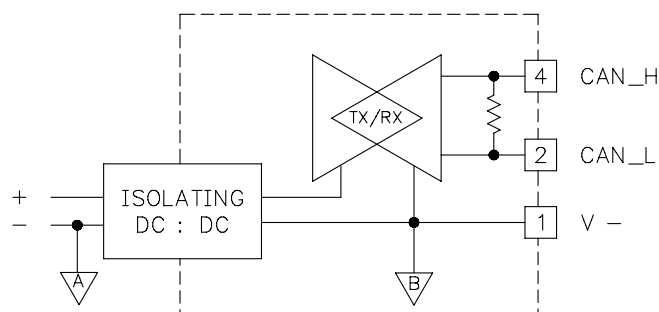   **Isolation from XCDN Communication ports Modular Controller Master or Data Station Plus**: 1000 VDC for 1 minute.
3. **CERTIFICATIONS AND COMPLIANCES:**
   Refer to main unit manual or "Agency Approvals" section of Red Lion's website for agency certifications.
   ELECTROMAGNETIC COMPATIBILITY
   Emissions and Immunity to EN 61326: Electrical Equipment for Measurement, Control and Laboratory use.
   Reference Modular Controller Master or Data Station Plus unit for EMC specifications
4. **ENVIRONMENTAL CONDITIONS:**
   Operating Temperature Range: 0 to 50°C
   Storage Temperature Range: -20 to 80°C
   Operating and Storage Humidity: 80% maximum relative humidity (non-condensing) from 0 to 50°C.
   Altitude: Up to 2000 meters.
5. **CONSTRUCTION:** Installation Category I, Pollution Degree 2.
6. **INSTALLATION REQUIREMENTS:** See "Installing the XCDN Option card" for more details.

BLOCK DIAGRAM

1

INSTALLING THE XCDN OPTION CARD

1. Remove power from the unit
2. Insert a flat-bladed screwdriver into the slot at the top of the expansion port cover. Gently apply pressure on the screwdriver in an upward direction until the expansion port cover disengages from the unit as shown in Figure 1.
3. Verify that the option card knobs are in the "unlocked" position as shown in Figure 2.
4. Carefully insert the option card into the expansion port opening while aligning the card-edge connector on the option card with the main board's header, as shown in Figure 3. Once aligned, gently press on the front of the card until it is flush with the front of the case.
5. Turn the option card knobs to the locked position as shown in Figure 4.

Caution: The expansion and main circuit boards contain static sensitive components. Before handling the cards, discharge static charges from your body by touching a grounded bare metal object. Ideally, handle the cards at a static controlled clean workstation. Also, handle the cards by the edges only. Dirt, oil, or other contaminants that may contact the cards can adversely affect circuit operation.

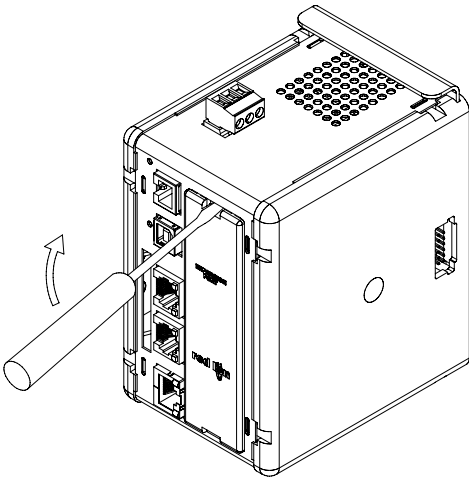**Warning: Risk of Danger:** Be sure to remove all power before removing the expansion port cover
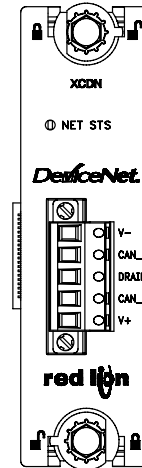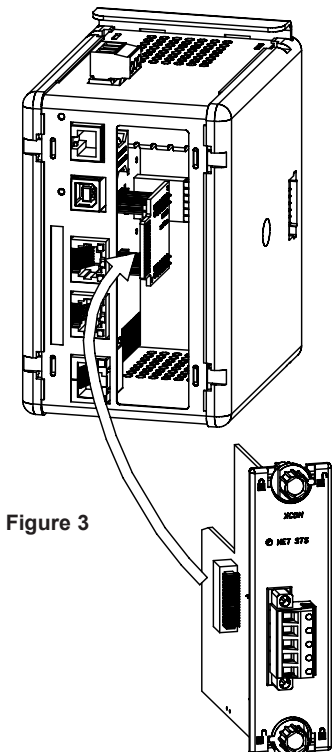

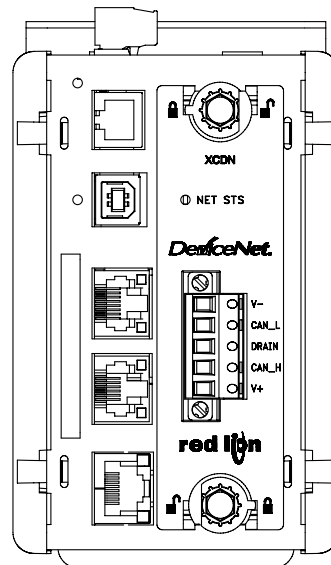**Figure 1**

Figure 2

Figure 3

Figure 4

POWER SUPPLY REQUIREMENTS
NEW AND EXISTING INSTALLATIONS
The XCDN option card draws all of its power from the main board of the Modular Controller Master or Data Station Plus. The specifications of the Modular Controller Master or Data Station Plus account for the power needs of an option card.

COMMUNICATING WITH THE XCDN OPTION CARD
CONFIGURING A XCDN OPTION CARD
The XCDN is configured using Crimson software. Crimson is available as a free download from www.redlion.net, or it can be ordered on CD. Updates to Crimson for new features and drivers are posted on the website as they become available. By configuring the XCDN using the latest version of Crimson, you are assured that your unit has the most up-to-date feature set. Crimson software can configure the XCDN through the RS232 PGM port, USB port, Ethernet port, or CompactFlash socket on your Modular Controller Master or Data Station Plus. Additional information can be found in your Modular Controller Master or Data Station Plus hardware bulletin and the Crimson user manual.

DeviceNet PORT PROTOCOLS
The XCDN option card has one DeviceNet port. This port may be configured for various DeviceNet protocols. Check www.redlion.net for currently supported protocols.

XCDN PORT PIN OUTS
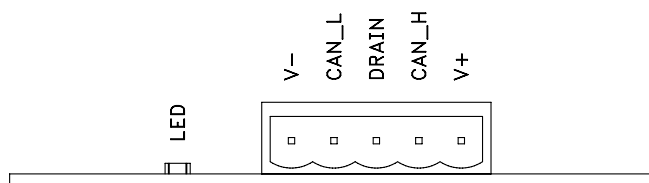
V-
Position 1 of the pluggable connector provides a CAN ground connection. This terminal is isolated from the Modular Controller Master and Data Station Plus.

CAN_L
Position 2 of the pluggable connector provides the CAN_L bus line (active low). This terminal is isolated from the Modular Controller Master and Data Station Plus.

DRAIN (OPTIONAL)
Position 3 of the pluggable connector is provided for optional drain connections. This position is available only to tie drain wires together or to earth ground. There is no internal connection to earth ground. The DRAIN position is not connected to any circuitry internal to the XCDN option card or Modular Controller Master and Data Station Plus.

CAN_H
Position 4 of the pluggable connector provides the CAN_H bus line (active high). This terminal is isolated from the Modular Controller Master and Data Station Plus.

V+ (OPTIONAL 24 VDC)
Position 5 of the pluggable connector is provided for optional 24 VDC connections. This position is available only to tie 24 VDC wires together. The XCDN card neither provides 24 VDC power nor uses 24 VDC power through this connection. The V+ position is not connected to any circuitry internal to the XCDN option card or Modular Controller Master and Data Station Plus.

SOFTWARE/UNIT OPERATIONS
LED

LED STATE	XCDN CARD INDICATION
OFF	Initializing
FLASHING GREEN	The device is online and is waiting on communications from other devices
GREEN	The device is online and has established communications with another device
FLASHING RED	One or more established communications have timed out
RED	The device has detected an error that has rendered it incapable of communicating on the network (duplicate MAC ID or bus activity).

CRIMSON SOFTWARE
Crimson 2.0 software is available as a free download from www.redlion.net or it can be purchased on a CD, see "Ordering Information" for part number. The latest version of the software is always available from the web site, and updating your copy is free.

TROUBLESHOOTING YOUR XCDN OPTION CARD
If for any reason you have trouble operating, connecting, or simply have questions concerning your new XCDN option card, contact Red Lion's technical support. For contact information, refer to the back page of this bulletin for phone and fax numbers.

EMAIL: techsupport@redlion.net
Web Site: http://www.redlion.net

LIMITED WARRANTY

The Company warrants the products it manufactures against defects in materials and workmanship for a period limited to two years from the date of shipment, provided the products have been stored, handled, installed, and used under proper conditions. The Company's liability under this limited warranty shall extend only to the repair or replacement of a defective product, at The Company's option. The Company disclaims all liability for any affirmation, promise or representation with respect to the products.

The customer agrees to hold Red Lion Controls harmless from, defend, and indemnify RLC against damages, claims, and expenses arising out of subsequent sales of RLC products or products containing components manufactured by RLC and based upon personal injuries, deaths, property damage, lost profits, and other matters which Buyer, its employees, or sub-contractors are or may be to any extent liable, including without limitation penalties imposed by the Consumer Product Safety Act (P.L. 92-573) and liability imposed upon any person pursuant to the Magnuson-Moss Warranty Act (P.L. 93-637), as now in effect or as amended hereafter.

No warranties expressed or implied are created with respect to The Company's products except those expressly contained herein. The Customer acknowledges the disclaimers and limitations contained herein and relies on no other warranties or affirmations.

red lion

Tel +1 (717) 767-6511
Fax +1 (717) 764-0839
www.redlion.net

MODEL XCCN - CANopen OPTION CARD FOR DATA STATION PLUS AND MODULAR CONTROLLER

- CONFIGURED USING CRIMSON SOFTWARE (VERSION 2.0 OR LATER)
- DIGITALLY ISOLATED CANopen PORT CAPABLE OF COMMUNICATING WITH ANY CANopen DEVICE
- EASY INSTALLATION

CANopen

GENERAL DESCRIPTION

Both the Modular Controller Master (enhanced models) and Data Station Plus contain a proprietary expansion port which provides a high speed, parallel architecture that extends the functionality and flexibility of the platform. This approach allows these products to evolve concurrently with the latest advances in communications and standards, without sacrificing performance. This high bandwidth channel has significantly greater throughput when compared to the traditional (external) serial gateway approach.

The XCCN option card adds a CANopen communication port to the series. This isolated card protects user equipment from potentially harmful ground loops while providing the ability to communicate to any high speed CANopen device. The XCCN option card has a termination resistor built-in, which is selectable via a jumper setting. Additionally, the XCCN connector is pluggable for easy removal of the Modular Controller Master or Data Station Plus from the CANopen bus without disturbing communications with other devices on the bus.

The XCCN communication card is easily installed by removing the blank expansion port cover of your Modular Controller or Data Station Plus, and plugging the XCCN card into the expansion port. Configuration is simple using Red Lion's free Crimson 2.0 software.

SAFETY SUMMARY

All safety related regulations, local codes and instructions that appear in the literature or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Do not use the controller to directly command motors, valves, or other actuators not equipped with safeguards. To do so can be potentially harmful to persons or equipment in the event of a fault to the controller.

> ⚠ **CAUTION: Risk of Danger.**
> Read complete instructions prior to installation and operation of the unit.

ORDERING INFORMATION

MODEL NO.	DESCRIPTION	PART NUMBER
XCCN	CANopen option card for Modular Controller or Data Station Plus	XCCN0000
SFCRM2	Crimson 2.0 with G3/Data Station Manual [1]	SFCRM200
SFCRM2	Crimson 2.0 with Modular Controller Manual [1]	SFCRM2MC

[1] Use these part numbers to purchase Crimson 2.0 on CD with a printed manual, USB cable and RS-232 cable. Otherwise, download free of charge from www.redlion.net.

CONTENTS OF PACKAGE

- XCCN option card
- This hardware bulletin

SPECIFICATIONS

1. **POWER REQUIREMENTS:** Power is supplied to the option card from the main board of the Modular Controller Master or Data Station Plus.
2. **COMMUNICATIONS:**
   CANopen Port: The CANopen port has format and baud rates that are software programmable up to 1M baud and are digitally isolated. This port may be configured for various CANopen protocols. Check www.redlion.net for currently supported protocols.
   Isolation from XCCN Communication ports to the Modular Controller Master or Data Station Plus: 1000 VDC for 1 minute.
3. **CERTIFICATIONS AND COMPLIANCES:**
   Refer to main unit manual or "Agency Approvals" section of Red Lion's website for agency certifications.
   ELECTROMAGNETIC COMPATIBILITY
   Emissions and Immunity to EN 61326: Electrical Equipment for Measurement, Control and Laboratory use.
   Reference Modular Controller Master or Data Station Plus unit for EMC specifications
4. **ENVIRONMENTAL CONDITIONS:**
   Operating Temperature Range: 0 to 50°C
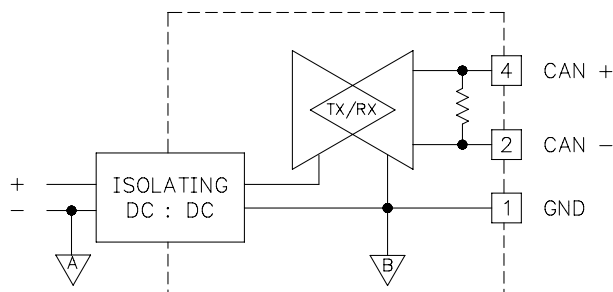   Storage Temperature Range: -20 to 80°C
   Operating and Storage Humidity: 80% maximum relative humidity (non-condensing) from 0 to 50°C.
   Altitude: Up to 2000 meters.
5. **CONSTRUCTION:** Installation Category I, Pollution Degree 2.
6. **INSTALLATION REQUIREMENTS:** See "Installing the XCCN Option card" for more details.

BLOCK DIAGRAM

INSTALLING THE XCCN OPTION CARD

1. Remove power from the unit
2. Insert a flat-bladed screwdriver into the slot at the top of the expansion port cover. Gently apply pressure on the screwdriver in an upward direction until the expansion port cover disengages from the unit as shown in Figure 1.
3. Verify that the option card knobs are in the "unlocked" position as shown in Figure 2.
4. Carefully insert the option card into the expansion port opening while aligning the card-edge connector on the option card with the main board's header, as shown in Figure 3. Once aligned, gently press on the front of the card until it is flush with the front of the case.
5. Turn the option card knobs to the locked position as shown in Figure 4.

Caution: The expansion and main circuit boards contain static sensitive components. Before handling the cards, discharge static charges from your body by touching a grounded bare metal object. Ideally, handle the cards at a static controlled clean workstation. Also, handle the cards by the edges only. Dirt, oil, or other contaminants that may contact the cards can adversely affect circuit operation.

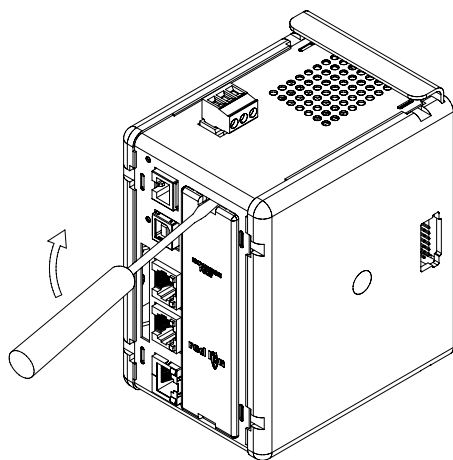**Warning: Risk of Danger:** Be sure to remove all power before removing the expansion port cover
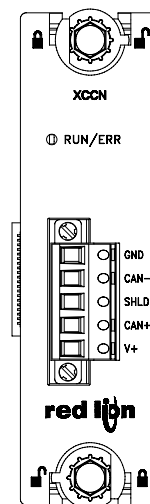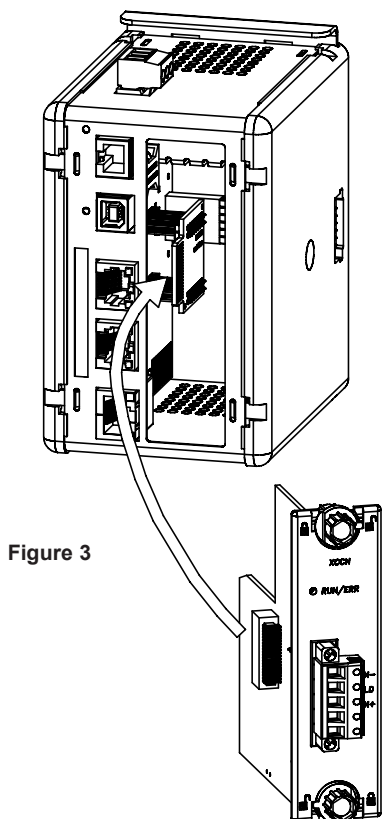

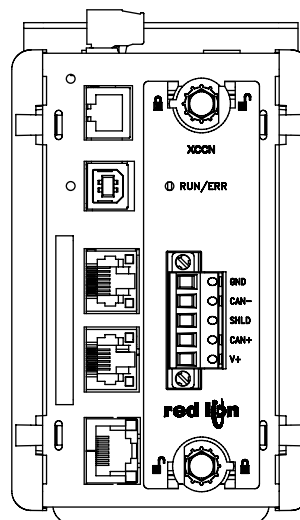**Figure 1**

Figure 2

Figure 3

Figure 4

2

POWER SUPPLY REQUIREMENTS
NEW AND EXISTING INSTALLATIONS
The XCCN option card draws all of its power from the main board of the Modular Controller Master or Data Station Plus. The specifications of the Modular Controller Master or Data Station Plus account for the power needs of an option card.

COMMUNICATING WITH THE XCCN OPTION CARD
CONFIGURING A XCCN OPTION CARD
The XCCN is configured using Crimson software. Crimson is available as a free download from www.redlion.net, or it can be ordered on CD. Updates to Crimson for new features and drivers are posted on the website as they become available. By configuring the XCCN using the latest version of Crimson, you are assured that your unit has the most up-to-date feature set. Crimson software can configure the XCCN through the RS232 PGM port, USB port, Ethernet port, or CompactFlash socket on your Modular Controller Master or Data Station Plus. Additional information can be found in your Modular Controller Master or Data Station Plus hardware bulletin and the Crimson user manual.

CANopen PORT PROTOCOLS
The XCCN option card has one CANopen port. This port may be configured for various CANopen protocols. Check www.redlion.net for currently supported protocols.

XCCN PORT PIN OUTS
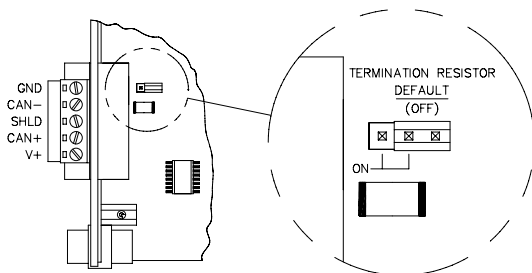
TERMINATION RESISTOR
An onboard termination resistor is selectable via a jumper setting. The termination resistor is rated for 124Ω at 1W. If a different termination resistance is desired, choose the jumper setting for no termination resistor and connect your own termination resistor between positions 2 and 4 of the five position connector.

GND
Position 1 of the pluggable connector provides a CAN ground connection. This terminal is isolated from the Modular Controller Master and Data Station Plus.

CAN-
Position 2 of the pluggable connector provides the CAN- bus line (active low). This terminal is isolated from the Modular Controller Master and Data Station Plus.

SHLD (OPTIONAL CAN SHIELD)
Position 3 of the pluggable connector is provided for optional shield connections. This position is available only to tie shield wires together or to earth ground. There is no internal connection to earth ground. The SHLD position is not connected to any circuitry internal to the XCCN option card or Modular Controller Master and Data Station Plus.

CAN+
Position 4 of the pluggable connector provides the CAN+ bus line (active high). This terminal is isolated from the Modular Controller Master and Data Station Plus.

V+ (OPTIONAL 24 VDC)
Position 5 of the pluggable connector is provided for optional 24 VDC connections. This position is available only to tie 24 VDC wires together. The XCCN card neither provides 24 VDC power nor uses 24 VDC power through this connection. The V+ position is not connected to any circuitry internal to the XCCN option card or Modular Controller Master and Data Station Plus.

LED
The LED will illuminate green when the XCCN option card establishes communication with other CANopen devices (RUN). The LED will illuminate red if no communications have been established with other CANopen devices (ERROR).

CRIMSON SOFTWARE
Crimson 2.0 software is available as a free download from www.redlion.net or it can be purchased on a CD, see "Ordering Information" for part number. The latest version of the software is always available from the web site, and updating your copy is free.

TROUBLESHOOTING YOUR XCCN OPTION CARD
If for any reason you have trouble operating, connecting, or simply have questions concerning your new XCCN option card, contact Red Lion's technical support. For contact information, refer to the back page of this bulletin for phone and fax numbers.

EMAIL: techsupport@redlion.net
Web Site: http://www.redlion.net

LIMITED WARRANTY

The Company warrants the products it manufactures against defects in materials and workmanship for a period limited to two years from the date of shipment, provided the products have been stored, handled, installed, and used under proper conditions. The Company's liability under this limited warranty shall extend only to the repair or replacement of a defective product, at The Company's option. The Company disclaims all liability for any affirmation, promise or representation with respect to the products.

The customer agrees to hold Red Lion Controls harmless from, defend, and indemnify RLC against damages, claims, and expenses arising out of subsequent sales of RLC products or products containing components manufactured by RLC and based upon personal injuries, deaths, property damage, lost profits, and other matters which Buyer, its employees, or sub-contractors are or may be to any extent liable, including without limitation penalties imposed by the Consumer Product Safety Act (P.L. 92-573) and liability imposed upon any person pursuant to the Magnuson-Moss Warranty Act (P.L. 93-637), as now in effect or as amended hereafter.

No warranties expressed or implied are created with respect to The Company's products except those expressly contained herein. The Customer acknowledges the disclaimers and limitations contained herein and relies on no other warranties or affirmations.

Red Lion Controls
20 Willow Springs Circle
York PA 17406
Tel +1 (717) 767-6511
Fax +1 (717) 764-0839

Red Lion Controls BV
Printerweg 10
NL - 3821 AD Amersfoort
Tel +31 (0) 334 723 225
Fax +31 (0) 334 893 793

Red Lion Controls AP
31, Kaki Bukit Road 3,
#06-04/05 TechLink
Singapore 417818
Tel +65 6744-6613
Fax +65 6743-3360